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DEPARTMENT OF AGRICULTURE AND TECHNICAL INSTRUCTION FOR IRELAND.

FISHERIES BRANCH.

SCIENTIFIC INVESTIGATIONS, 1902-1903.

No. II.

Report on the Copepoda of the Atlantic Slope off Counties Mayo and Galway,

by G. P. Farran, B.A.

This paper may be referred to as—

"*Ann. Rep. Fish., Ireland*, 1902-03, *Pt. II., App. II.* [1905].

1905.

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APPENDIX, No. II.

REPORT ON THE COPEPODA OF THE ATLANTIC SLOPE OFF COUNTIES MAYO AND GALWAY.

BY

G. P. FARRAN, B.A.

PLATES III.—XIII.

i. Introductory.
ii. Table of Relative Abundance.
iii. List of Species.

i.—INTRODUCTORY.

During the summer of 1901 the S.S. "Helga" made two expeditions into moderately deep water off the west coast of Ireland, and brought back several townettings containing a large supply of Copepoda. The first of these expeditions was to the Porcupine Bank, which lies 100 miles true west of Co. Galway, and rises to within 85 fathoms of the surface.

The bearings of the positions on the Bank where the collections were made, and the symbols by which they are distinguished in the following pages, are as follows:—

PORCUPINE III.—Lat. 53° 24′ N., Long. 13° 34′ W., 29th June, 1901.

(*a.*) Medium silk townet—surface.
(*b.*) Medium silk townet—50 fath.
(*c.*) Medium silk townet—100 fath.
(*d.*) Coarse silk townet above Naturalist's dredge—91 fath.

PORCUPINE IV.—Lat. 53° 23′ N., Long. 13° 12′ W., 29th June, 1901.

Coarse silk townet above Naturalist's dredge—120 fath.

PORCUPINE V.—Lat. 53° 23′ N., Long. 12° 43′ W., 29th June, 1901.

(*a.*) Medium and coarse silk townets—surface.
(*b.*) Medium and coarse silk townets—90 fath.
(*c.*) Medium and coarse silk townets—175 fath.

The Porcupine Bank is connected with the mainland by a narrow neck, the greatest depth of water on which is 185 fathoms. To the south of this neck, and lying between the Bank and the mainland, is an ocean valley

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with comparatively steep sides and a general north and south direction, which descends to a depth of over 1,000 fathoms. On the north side the connecting neck slopes rather abruptly into deep water. It was on the northern slope of this connecting ridge, about 50 miles true west of Achill Head, Co. Mayo, that the collections of the second expedition were made.

The bearings of the stations of the second expeditions and the collections made on them were as follows:—

HELGA CXX.—Lat. 53° 58′ N., Long. 12° 28′ W., 24th Aug., 1901

Medium silk townet, *ca.* 200 fath.
Townets attached to trawl—382 fath.

HELGA CXXI.—Lat. 53° 52′ N., Long. 11° 56′ W., 24th Aug., 1901.

Townets attached to trawl—199 fath.

The two nets used on both expeditions were of the ordinary open ring pattern.

The number of species taken were:—

Calanidae,	45
Centropagidae,	17
Candaciidae,	1
Pontellidae,	1
Cyclopidae,	2
Harpacticidae,	3
Oncaeidae,	2

Of these the following thirteen species have been described as new:—*Bradyetes inermis, Bryaxis minor, Gaetanus Holti, Gaetanus minor, Scolecithrix emarginata, Scolecithrix ovata, Scolecithrix echinata, Xanthocalanus Greeni, Xanthocalanus pinguis, Xanthocalanus obtusus, Oöthrix bidentata, Lucicutia curta, Aegisthus spinulosus.*

Two new genera, Bradyetes and Oöthrix, have been instituted for two of the above species.

The most noticeable feature of the collection is the large number of bottom-haunting forms which were obtained by means of townets attached to the trawl. It was by this means that the majority of the new species described below were caught, and it is probable that large additions to the number of oceanic Copepoda may be looked for in the future by the employment of this method.

One of the townets attached to the trawl at station Helga CXXI., came up filled with muddy sand, which, when washed, yielded the following species:—*Bradyidius armatus* (in large numbers), *Bryaxis brevicornis, Actideus armatus, Chiridius armatus, Xanthocalanus borealis, Oöthrix bidentata, Pleuromamma robusta*, thus emphasising their bottom-loving habit.

Most of the species mentioned in this paper have been already recorded from the Atlantic, but three of them have, as far as I know, only been taken previously in the Pacific, viz., *Undeuchaeta major, Euchaeta tonsa*, and *Metridia venusta*, though the last may possibly be identical with *M. Normani*. Of the rest, omitting some doubtful records, thirty seem to be universally distributed, seven have been recorded from the Atlantic and Mediterranean, and fifteen from the Atlantic only. The collection may be regarded as fairly typical of the N.E. Atlantic Copepod fauna, as may be seen by comparing it with the list published by the late Mr. I. C. Thompson from the "Oceana" collection.* The "Oceana" townettings were taken a little further south and in very much deeper water; and although the number of townettings taken and species recorded is much larger, yet the correspondence between the families and genera and, to a large extent, between the species of the two lists, is very marked.

* *Ann. and Mag. N. Hist.*; Ser. 7, Vol. xii.

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It is only after a prolonged series of investigations, such as those here recorded that we can begin to form some idea of the nature of the fauna which exists in the deeper waters which surround our coasts. The rapid extension of the trawling industry in recent years, and the fact that depths, which a short time ago were practically unknown even to the naturalist with his dredge, are now called upon to contribute regularly to the markets of our cities, makes it a matter of importance that we should have some accurate knowledge of the invertebrate life of these regions, on which the fish-life ultimately depends.

The Copepoda in particular are deserving of investigation, forming as they do the principal food of most fishes in their early stages, and of many fishes throughout their life. The knowledge of the distribution of the various species, and the distinguishing of those with a universal range from those whose habitat is exclusively tropical or boreal, may serve to throw light on many doubtful points. The existence and direction of ocean currents may be indicated by the chance occurrence of species which have their centres of distribution in other waters, and as another instance of the possible usefulness of this knowledge, I may mention the occurrence of specimens of *Pleuromamma robusta* in some of the stomachs of the earliest spring mackerel to arrive off the coast of Cleggan, Co. Galway, in the spring of 1902. This copepod has never been taken on the fishing-grounds, but as these and other investigations show, it is not uncommon in the deeper waters off our western coasts.*

The capture of *Gaetanus pileatus* in a mackerel's stomach, as recorded in last year's report (*Report on Sea and Inland Fisheries of Ireland for* 1901, Pt. II., App., p. 120), is not quite a parallel instance, as that copepod was taken from a small winter mackerel.

It is to further facts and coincidences of this nature that we must look for enlightenment on that still mysterious subject which is of the utmost importance to the western counties of Ireland, the causes of the periodic arrival and disappearance of the mackerel, and it is only by the continuous collection of what may appear to most people as insignificant details that these facts can be acquired. Fortunately it is now but seldom asserted that all researches which do not admit of their results being estimated by an immediate cash equivalent are indefensible waste of time and money.

In the list which follows the nomenclature of Giesbrecht, as given in "Das Tierreich," has been used.

The symbols made use of in the table of species are:—A = abundant, C = common, M = moderate, F = few, VF = very few, × = one to three specimens.

* Another fact, brought to my notice by Mr. Holt, which seems to point to the same conclusion was that of the first four spring mackerel captured in the Blacksod Fishery, Co. Mayo, in 1899 (13th April), two had empty stomachs and the other two were crammed with large specimens of *Nyctiphanes norvegica*. Large specimens of this schizopod are not known to occur on the west coast of Ireland except at a considerable distance from land, though they are sometimes taken on the east coast.

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ii.—Table of

—	Porcupine III.A Surface.	Porcupine III.B 50 fath.	Porcupine III.C 110 fath.	Porcupine III.D Above Dredge.	Porcupine IV. Above Dredge.	Porcupine V.A Surface.
Calanus finmarchicus, ...	–	×	F	M	A	–
Cal. tenuicornis, ...	–	×	–	–	–	–
Eucal. elongatus, ...	–	×	×	VF	F	–
Eucal. crassus, ...	–	–	×	–	×	–
Rhincal. nasutus, ...	–	×	M	A	M	–
Paracal. parvus, ...	–	VF	VF	–	–	VF
Ctenocal. vanus, ...	–	×	×	–	–	–
Pseudocal. elongatus, ...	×	F	F	–	×	–
Spinocal. abyssalis, ...	–	–	×	–	–	–
Spinocal. magnus, ...	–	–	–	–	×	–
Aetideus armatus, ...	–	×	×	–	–	–
Bradyidius armatus, ...	–	–	–	VF	–	–
Bradyetes inermis, ...	–	–	–	–	–	–
Bryaxis brevicornis, ...	–	–	–	–	–	–
Bryaxis minor, ...	–	–	–	–	–	–
Gaidius tenuispinus, ...	–	–	–	–	–	–
Gaidius brevispinus, ...	–	–	–	–	–	–
Gaetanus major, ...	–	–	–	–	–	–
Gaetanus pileatus, ...	–	–	–	–	–	–
Gaetanus Holti, ...	–	–	–	–	–	–
Gaetanus minor, ...	–	–	–	–	–	–
Chiridius armatus, ...	–	–	–	–	–	–
Chiridius Poppei, ...	–	–	–	–	–	–
Undeuchaeta major, ...	–	–	–	–	–	–
Undeuchaeta minor, ...	–	–	–	–	–	–
Euchirella rostrata, ...	–	–	–	–	–	–
Euchir. curticauda, ...	–	–	–	–	–	–
Euchaeta acuta, ...	–	–	–	–	–	–
Euchaeta norvegica, ...	–	–	–	–	–	–
Euchaeta tonsa, ...	–	–	–	–	–	–
Scolecithrix dentata, ...	–	–	×	–	–	–
Scol. minor, ...	–	–	×	–	–	–
Scol. pygmaea, ...	–	–	×	–	–	–
Scol. cristata, ...	–	–	–	–	–	–
Scol. chelifer, ...	–	–	–	–	–	–

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RELATIVE ABUNDANCE

PORCUPINE V.B. 90 fath. (medium).	PORCUPINE V.B 90 fath. (coarse).	PORCUPINE V.C 175 fath.	HELGA CXX. 200 fath.	HELGA CXX. On Trawl.	HELGA CXXI. On Trawl.	—
A	A	C	-	A	A	Calanus finmarchicus.
-	-	-	-	-	-	Cal. tenuicornis.
F	M	×	-	VF	-	Eucal. elongatus.
×	×	-	-	×	×	Eucal. crassus.
×	×	×	-	×	M	Rhincal. nasutus.
×	-	VF	×	-	-	Paracal. parvus.
-	-	-	×	-	-	Ctenocal. vanus,
F	×	M	C	-	-	Pseudocal. elongatus.
-	-	-	×	-	-	Spinocal. abyssalis.
-	-	-	×	VF	×	Spinocal. magnus.
×	-	-	×	×	×	Aetideus armatus.
-	-	×	-	×	C	Bradyidius armatus.
-	-	-	-	×	-	Bradyetes inermis.
-	-	-	-	-	×	Bryaxis brevicornis.
-	-	-	-	×	-	Bryaxis minor.
-	-	-	-	×	-	Gaidius tenuispinus.
-	-	-	-	×	-	Gaidius brevispinus.
-	-	-	-	×	-	Gaetanus major.
-	-	-	-	×	-	Gaetanus pileatus.
-	-	-	-	×	-	Gaetanus Holti.
-	-	-	-	×	-	Gaetanus minor.
-	-	-	-	F	×	Chiridius armatus.
-	-	-	-	×	-	Chiridius Poppei.
-	-	-	-	×	-	Undeuchaeta major.
-	-	-	-	×	×	Undeuchaeta minor.
-	×	-	-	-	-	Euchirella rostrata.
-	-	-	-	×	-	Euchir. curticauda.
×	×	-	-	-	×	Euchaeta acuta.
-	-	-	×	VF	VF	Euchaeta norvegica.
-	-	-	-	×	-	Euchaeta tonsa.
×	-	-	×	×	-	Scolecithrix dentata.
VF	-	-	F	-	-	Scol. minor.
-	-	-	-	-	-	Scol. pygmaea.
-	-	-	-	F	-	Scol. cristata.
-	-	-	-	×	-	Scol. chelifer.

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TABLE OF RELATIVE

—	PORCUPINE III.A Surface.	PORCUPINE III.B 50 fath.	PORCUPINE III.C 110 fath.	PORCUPINE III.D Above Dredge.	PORCUPINE IV. Above Dredge.	PORCUPINE V.A Surface.
Scol. emarginata, ...	-	-	-	-	-	-
Scol. ovata, ...	-	-	-	-	-	-
Scol. echinata, ...		-	×	-	-	-
Xanthocalanus borealis, ...	-	-	-	-	×	-
Xanthocal. Greeni, ...	-	-	-	-	-	-
Xanthocal. pinguis, ..	-	-	-	-	-	-
Xanthocal. obtusus, ...	-	-	-	-	-	-
Xanthocal. sp.? ♂ ...	-	-	-	-	×	-
Brachycal. atlanticus, ...	-	-	-	-	-	-
Oöthrix bidentata, ...	-	-	-	-	-	-
Phaenna spinifera, ..	-	-	-	-	-	-
Centropages typicus, ...	-	×	×	-	-	VF
Temora longicornis, ...	-	-	-	-	-	-
Metridia lucens, ...	VF	F	F	VF	F	VF
Metridia venusta, ...	-	-	-	-	-	-
Metridia princeps, ...	-	-	-	-	-	-
Pleuromamma robusta, ..	-	-	-	-	VF	-
Lucicutia flavicornis, ...	-	-	×	-	-	-
Lucicutia curta, ...	-	-	-	-	-	-
Lucicutia atlantica, ...	-	-	-	-	×	-
Heterorhabdus spinifrons, ...	-	-	-	-	-	-
Heteror. norvegicus, ...	-	-	-	-	-	-
Heteror. abyssalis, ...	-	-	-	-	VF	-
Heteror. vipera, ...	-	-	-	-	-	-
Heteror. longicornis, ...	-	-	-	-	-	-
Haloptilus longicornis, ...	-	-	-	-	-	-
Halop. acutifrons, ...	-	-	-	-	×	-
Phyllopus bidentatus, ...	-	-	-	-	-	-
Candacia norvegica, ..	-	-	-	-	-	-
Acartia Clausi, ...	F	A	A	×	VF	A
Oithona similis, ...	M	VF	VF	-	×	×
Oithona plumifera, ...	-	F	VF	-	×	-
Microsetella atlantica, ...	-	×	-	-	-	-
Aegisthus mucronatus, ...	-	-	-	-	×	-
Aegisthus spinulosus, ...	-	-	-	-	-	-
Oncaea conifera, ...	-	×	F	-	×	×
Conaea rapax, ...	-	-	×	-	-	-
Idya furcata, ...	-	-	-	-	-	-

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ABUNDANCE—*continued.*

PORCUPINE V.B 90 fath. (medium).	PORCUPINE VR. 90 fath. (coarse).	PORCUPINE V.C 175 fath	HELGA CXX. 200 fath.	HELGA CXX. On Trawl.	HELGA CXXI. On Trawl.	—
-	-	-	-	VF	-	Scol. emarginata.
-	-	-	-	×	-	Scol. ovata.
-	-	-	-	-	-	Scol. echinata.
-	-	-	-	F	F	Xanthocalanus borealis.
-	-	-	-	×	-	Xanthocal. Greeni.
-	-	-	-	×	-	Xanthocal. pingui
-	-	-	-	×	-	Xanthocal. obtusus.
-	-	-	-	-	×	Xanthocal. sp.? ♂
-	-	-	-	-	×	Brachycal. atlanticus.
-	-	-	-	(×)	×	Oöthrix bidentata.
×	-	-	-	×	-	Phaenna spinifera.
×	×	×	-	-	-	Centropages typicus.
-	-	-	×	-	-	Temora longicornis.
M	F	-	M	F	M	Metridia lucens.
-	-	-	-	VF	-	Metridia venusta.
-	-	-	-	×	-	Metridia princeps.
VF	×	-	-	F	F	Pleuromamma robusta.
-	-	-	-	-	-	Lucicutia flavicornis.
-	-	-	-	×	-	Lucicutia curta.
-	-	-	-	-	-	Lucicutia atlantica.
-	-	-	-	×	-	Heterorhabdus spinifrons.
-	-	-	-	VF	VF	Heteror. norvegicus.
-	-	-	-	F	-	Heteror. abyssalis.
-	-	-	-	VF	-	Heteror. vipera.
-	-	-	-	×	-	Heteror. longicornis.
-	-	×	-	-	-	Haloptilus longicornis.
-	-	-	-	-	-	Halop. acutifrons.
-	-	-	-	×	-	Phyllopus bidentatus.
-	-	-	-	×	-	Candacia norvegica.
F	×	A	C	-	×	Acartia Clausi.
×	×	VF	-	-	-	Oithona similis.
×	×	×	-	-	-	Oithona plumifera.
-	×	-	-	-	-	Microsetella atlantica.
-	-	-	-	-	-	Aegisthus mucronatus.
-	-	-	-	×	-	Aegisthus spinulosus.
×	-	F	VF	-	-	Oncaea conifera.
-	-		-	-	-	Conaea rapax.
-	-	..	-	-	×	Idya furcata.

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iii.—LIST OF SPECIES.

CALANIDAE.

Calanus finmarchicus, (Gunn.).

Scarce at Porcupine III. except at the bottom; plentiful in the middle and bottom nets at Porcupine V., and apparently absent from Helga CXX., except when stirred up from the bottom by the trawl. In size these specimens, all ♀, agree with Sars' *C. heligolandicus*, the average length being 3·1. The outline of the head and the proportions of the furca are, however, intermediate between *C. heligolandicus* and *C. finmarchicus*, as figured by G. O. Sars,* as is also the case with most specimens from the west coast of Ireland.

Calanus tenuicornis, Dana.

Two specimens, ♀, occurred in mid-water net at Porcupine III.

Eucalanus elongatus (Dana.).

Common throughout the Porcupine collection; occurred sparingly at Helga CXX. in tow-nets on trawl, and not at all at Helga CXXI.

Eucalanus crassus, Giesbr.

Was found in small numbers at both Porcupine and Helga CXX., CXXI. stations.

Rhincalanus nasutus, Giesbr.

Common at Porcupine III. and IV., scarce at Porcupine V., and only in the townets on the trawl at Helga CXX. and CXXI.

Paracalanus parvus (Cls.).

Found in most of the Porcupine townettings, but only in the middle net at Helga CXX.

Ctenocalanus vanus, Giesbr.

In very small numbers in the mid-water nets at Porcupine III. and Helga CXX. stations.

Pseudocalanus elongatus (Boeck).

Occurred in small numbers all through the collection, except in the townets on the trawl at stations Helga CXX. and CXXI.

Spinocalanus abyssalis, Giesbr.

Single specimens, ♀, in mid-water-nets at Porcupine III. and Helga CXX.

Spinocalanus magnus, Wolfenden.

(Pl. III., Figs. 1-12).

Length ♀ 2·9, ♂ immature 2·1 mm.

Female—Ceph. imperfectly separated from Th. 1. Th. 4 separated from Th. 5. Rostrum absent. Ceph. much more vaulted than in *S. abyssalis*. Th. 5 produced laterally into rounded lobes, reaching nearly to middle of gen. seg., sometimes bearing a tuft of ventrally-directed hairs, as found in some species of Euchaeta.

* *Crustacea of Norway*, Vol. IV. Copepoda, Pl. I.-IV.

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Abdomen with four segments. Gen. seg. with strongly-developed ventral protuberance. Furcal rami slightly asymmetrical, the right one being somewhat larger and bearing a much enlarged 3rd seta.

1st Antenna (Pl. III., Fig. 3) had, in all the specimens obtained, lost about half its length, but would probably reach a little beyond the furca.

2nd Antenna (Pl. III., Fig. 4) with endop. nearly as long as exop., differing in this respect from *S. abyssalis*.

Mandible (Pl. III., Fig. 5), as in *S. abyssalis*.

Maxilla (Pl. III., Fig. 6).

1st Maxillipede (Pl. III., Fig. 7) resembles that in *S. abyssalis*.

2nd Maxillipede (Pl. III., Fig. 8) comparatively shorter than in *S. abyssalis*, with setae on outer edge of joints 5 and 6 strongly developed and feathered, as in Calanus.

All the swimming feet (Pl. III., Fig. 9--12) are somewhat stouter than in *S. abyssalis*, but agree in jointing and number of setae.

2nd foot (Pl. III., Fig. 10) with a curved row of strong spinules across lower face of 2nd joint of endop.; a row of spinules, slightly smaller, on 2nd and 3rd joints of exop.

3rd foot (Pl. III., Fig. 11) with transverse row of spinules on 2nd and 3rd joints of both exop. and endop., those on the endop. being the larger.

The basal joint of 4th foot (Pl. III., Fig. 12) has a row of long slender spinules, running from its inner edge half-way across the lower face of the joint.

5th feet absent.

A single specimen of the male was obtained, but being immature was not examined in detail. In general configuration it approached the female very closely.

This species is separated by both size and details of structure from *S. abyssalis*, as also from *S. Schaudinii*,* if that form is specifically distinct.

It occurred in small numbers in the mid-water tow-net at Helga CXX., and more plentifully in tow-nets on trawl at Helga CXX. and CXXI. A single example was found in tow-nets on trawl at Porcupine IV.

[Since the above went to press this species has been described by Dr. Wolfenden,† and here appears under the name given by him.]

Aetideus armatus, Brady.

In small numbers in the mid-water nets at Porcupine III. and V. and Helga CXX., and also in the townets on trawl at Helga CXX and CXXI. The specimens were mostly females, but a very few males were also found.

Bradyidius armatus, Vanhöffen=**Undinopsis Bradyi**, G. O. Sars.

Females plentiful and males moderately common in a sample of fine muddy sand brought up by one of the townets on the trawl at station Helga CXXI. They were by far the most abundant copepod in this sample.

A few specimens also occurred at Porcupine III. and V. and Helga CXX.

Genus **Bradyetes**, n. gen.

This genus is very closely allied to Bradyidius, Giesbr. (Undinopsis, G. O. Sars), differing chiefly in the absence of a rostrum and of acute terminations to the 5th thoracic segments.

Cephalon imperfectly separated from 1st thoracic segment, deeply inflexed in lateral margin, as in Bryaxis, thoracic segments 4--5 coalesced, their posterior margin rounded. 1st antennae very strongly setose; 2nd antennae with exop. longer than endop. Other appendages as in Bradyidius. 5 feet absent in female.

* Mzarek—*Arktische Copepoda* in Römer and Schaudin, *Fauna Arctica*, p. 509.

† *Jour. Mar. Biol. Assc.*, N. S. Vol. VII. No. 1, April, 1904, p. 118.

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Bradyetes inermis, n. sp.

(Pl. III., Figs. 13-20; Pl. IV., Figs. 13-14).

Length, female, 2·57 mm. Male unknown.

Cephalothorax, ovate elongate. Abdomen of four segments, in the proportion 6 : 4 : 3 : 2. Furcal rami slightly longer than broad.

1st Antennae (Pl. III., Fig. 15) 24-jointed, very setose, reaching to middle of genital segment. Length of joints in ·01 mm. :—

1.	2	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24
12.	14.	7.	6.	6.	6.	6.	11.	6.	7.	8.	9.	10.	10.	10.	10.	10.	10.	10.	10.	8.	12.	10.	6.

Strong ringed setae on joints 1, 2, 7, 13, 17, 20, 21, 22, 23, and 24.

2nd Antennae (Pl. III., Fig. 16) with exop. 1¼ times as long as endop., the last joint being very long and slender; two papillae on 1st joint and one on 2nd joint, each bearing a small seta.

Maxilla (Pl. III., Fig. 17) with very small exopodite.

2nd Maxillipede (Pl. III., Fig. 18) with the last five joints very short, measuring together about ½ of 2nd joint; 4th and 5th joints of about equal length.

1st foot (Pl. III., Fig. 19) with very large distal outer edge spine on 2nd joint of exop.; 3rd joint rather long in proportion to its width.

2nd to 4th feet (Pl. III., Fig. 20; Pl. IV., Figs. 13–14) with setae and jointing as in Bradyidius; very long and slender. Terminal spines of exopod., long, narrow, and finely denticulate.

A single female was found in townets on trawl at station Helga CXX.

Bryaxis brevicornis, G. O. Sars.

Two specimens, females, found along with *Bradyidius armatus* in muddy sand from station Helga CXXI.

Bryaxis minor, n. sp.

(Pl. IV., Figs. 1–5, 7–12).

Length, female, 1·6 mm. Male, unknown.

Cephalothorax, robust ovate. Cephalon joined to Th. 1. Th. 4 separated from Th. 5., the latter ending in a hooked projection directed dorsally, as in *B. brevicornis*.

Abdomen with four segments, short and stout. Genital seg., equal to the two succeeding segments. Furcal rami as broad as long.

1st Antenna (Pl. IV., Fig. 3), 24-jointed, very setose, reaching to beginning of Th. 4. Length of antennal joints in ·01 mm. :—

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24
10.	6.	2·5.	2·5.	2 5.	2·5.	2·5.	5.	3.	3.	3.	6.	6.	6.	6.	6.	6.	6.	5.	4.	3.	7.	4.	3.

2nd Antenna (Pl. IV., Fig. 4) with outer branch very short. The terminal joint is longer than the 2nd, and bears three well-developed setae.

The setae on joints 3 to 6 are very slender. It differs in this respect from that of *B. brevicornis* (Pl. IV., Fig. 6), which has strong setae on 3rd to 6th joints, and slender terminal ones on the very small 7th joint.

Maxilla (Pl. IV., Fig. 7) as in *B. brevicornis*.

1st Maxillipede (Pl. IV., Fig. 8) with strong setae on all the lobes; a strong curved spine on lobe 5, and a longer but more slender spine on lobe 4. Lobes 1 to 4 bear each a few very stout terminal spinules.

2nd Maxillipede (Pl. IV., Fig. 9) resembles that of *B. brevicornis*; the sensory appendage on the end of the 1st joint was not observed.

Feet 1–4 (Pl. IV., Figs. 10-12) closely resemble those of *B. brevicornis*.

Three specimens of this form, all females, were found at Helga CXX. in the tow-nets on the trawl. This species comes very close to *B. brevicornis*, and is separated mainly by the difference in size and in proportions of the 2nd antenna, both of which points seem to be constant.

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Gaidius tenuispinus, G. O. Sars.

Four specimens, females, $l=3{\cdot}2$ mm., which seem to be referable to this species, occurred in the townets on trawl at Helga CXX. They differed slightly in some respects from the form figured by G. O. Sars; the thoracic spines were scarcely so long, and the segmentation between the 1st and 2nd joint of the exop. of 1st foot, and between the 1st and 2nd joint of the endop. of 2nd foot, was not so distinctly marked. In both these points, as also in size, they approximated somewhat to *G. pungens*.

They also possessed the lamelliform spines on the 1st basal of 4th foot.

Gaidius brevispinus, G. O. Sars.

A single specimen, a female, showing immature segmentation of the abdomen, $l=3$ mm., occurred in the townets on trawl at Helga CXX.

The spines and jointing of the feet were as in *G. brevispinus*, and the 2nd mxp. had a lamellar appendage on 1st joint and fine serrulations on the proximal part of the upper edge of the 2nd joint.

Gaetanus major (Wolfenden).

Two specimens, a female, $l=4{\cdot}7$ mm., and an immature male, $l=4{\cdot}3$ mm., occurred in townets on trawl at station Helga CXX. Dr. Wolfenden, to whom I submitted drawings of the animal, has kindly confirmed my identification of these specimens with the species described by him.

Gaetanus pileatus (Farran).

Two immature females, $l=4{\cdot}6$ mm., and an immature male, $l=3{\cdot}5$, were found in the townets on trawl at Helga CXX., which, in spite of the difference in size, seem to be referable to the above species. The possession of a 2-jointed exop. by the 1st foot serves to distinguish them from *G. caudani*.

Gaetanus Holti, n. sp.

(Pl. VI., Figs. 1–12).

Length, female, 5·1 mm. Male unknown.

Body (Pl. VI., Figs. 1–2) very robust. Ceph. joined to Th. 1. Th. 4 and Th. 5 are fused and produced backwards on either side into a long slender process starting from the ventral margin, and reaching to the end of the genital segment.

Abdomen of four segments. Genital seg. slightly broader than long, ventrally swollen, longer than the two succeeding segments; 2nd, 3rd, and anal segments of about equal length. Furcal rami slightly broader than long.

1st Antenna (Pl. VI., Fig. 3) 23-jointed, reaching to furca.

Length of antennal joints in ·01 mm.:—

1.	2.	3.	4.	5.	6.	7.	8.	9.	10	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23	24
24.	18.	12.	13.	16.	16.	16.	26.	14.	16.	16.	28.	28.	27.	25.	25.	25.	32.	30.	24.	32.	28.	28.	8.

2nd Antenna (Pl. VI., Fig. 4) with two papillae on 2nd joint of exop., each with a short seta.

Mandible (Pl. VI., Fig. 5) and maxilla (Pl. IV., Fig. 6) do not differ noticeably from those of the other species of the genus.

1st Maxillipede (Pl. VI., Fig. 7) with spine on 5th lobe smaller than that on 4th.

2nd Maxillipede (Pl. VI., Fig. 8) with the five terminal joints very short. The form of the sensory lobe on the 1st joint could not be made out; proximal part of upper edge of 2nd joint very finely denticulate.

1st foot (Pl. VI., Fig. 9) with 3-jointed exop., the 1st joint terminating on the outer edge with a small inconspicuous spine.

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2nd and 3rd feet (Pl. VI., Figs. 10–11) with no distinguishing features.

4th foot (Pl. VI., Fig. 12), 1st basal joint with a row of lamellae running along inner edge, and curving across lower face of the joint.

5th feet absent.

One specimen was obtained in the townets on the trawl at station Helga CXX.

This species has the upright spine of *G. miles*, and the short antennae and 3-jointed exop. of 1st foot of *G. armiger*, and thus forms a link between the two sections of the genus. It differs from all described species except *G. caudani* in having a spine on the outer edge of the 1st joint of exop. of 1st foot.

Gaetanus minor, n. sp.

(Pl. V., Figs. 1–11).

Length, female, 2·4 mm.

Cephalic spine slender, directed forwards, as in *G. armiger*.

Thoracic segments 4 and 5 fused, with long slender spines reaching to end of genital segment.

Abdomen of 4 segments, short; genital segment slightly swollen ventrally; equal in length to the two following segments.

1st Antenna (Pl. V., Fig. 3) 23-jointed, reaching to end of genital segment; length, 1·7 mm. Length of antennal joints in ·01 mm.:—

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.
12.	8.	5.	4	5.	5.	6.	8.	5.	5.	6.	8.	8.	10.	10.	11	11.	14.	12.	10.	13.	12.	15.

2nd Antenna (Pl. V., Fig. 4) with rather slender endop., about half as long as the exop.

Mandible and Maxilla (Pl. V., Fig. 5) resemble those of *G. armiger*; the setae on the end of the 2nd inner lobe of the Maxilla are unusually large.

1st Maxillipede (Pl. V., Fig. 6) with one of the setae on 1st lobe a little stronger than those on the succeeding lobes.

2nd Maxillipede (Pl. V., Fig. 7) with 4th and 5th joints equal, the 2nd joint without denticulations.

1st foot (Pl. V., Fig. 8) with 2-jointed exop.; no sign of segmentation in the 1st joint.

2nd foot (Pl. V., Fig. 9) with 1-jointed endop., its 1st outer edge and 2nd inner edge seta being very slender. Terminal spines of the exop. of this, as of the 3rd and 4th feet, very coarsely toothed.

3rd and 4th feet (Pl. V., Figs. 10–11), rather slender, the inner edge of 1st basal joint of both being finely setose.

This species is the smallest of the genus and differs from any previously described in the 1-jointed exop. of 2nd foot, and in the shortness of the 1st antennae.

A female and an immature male, which was not examined in detail, were taken in the mid-water net at Helga CXX. In the bottom net at Porcupine IV. there occurred some very immature specimens, ♂ and ♀, of a Gaetanus, length about 2 mm., which closely resembled the above, with the exception that their 1st antennae reached to the furca. These may possibly prove, when mature specimens are found, to belong to a new species.

Chiridius armatus (Boeck.).

Six males of this species, l=3·5 mm., were found in the townets on trawl at Helga CXX., and one female, l=3·3 mm., in townets on trawl at Helga CXXI.

In company with the above, at Helga CXX., there occurred several specimens, both ♂ and ♀, of a form which agreed very closely in everything but size with *C. armatus*. The length of fully matured specimens of the smaller variety was 2·65 mm. for both sexes.

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Chiridius Poppei, Giesbr.

A single specimen, female, $l = 2{\cdot}64$ mm., very like *C. armatus* in appearance, but without a rostrum, and having the endop. of 2nd feet one-jointed, seems to be referable to this species. The caudal rami had been broken off, which helps to render the identification uncertain. It was found in the townets on trawl at Helga CXX.

Undeuchaeta major, Giesbr.

One specimen, female, $l = 5{\cdot}28$ mm., was found at Helga CXX., in townets on trawl.

Undeuchaeta minor, Giesbr.

One specimen, female, $l = 4{\cdot}2$ mm., in tow-nets on trawl at Helga CXX., and another at Helga CXXI.

The size of both this and the preceding species is somewhat greater than that given by Giesbrecht, but in other respects they agree with his description.

Euchirella rostrata (Cls.).

One specimen, female, $l = 3{\cdot}5$ mm., occurred in the mid-water net at Station Porcupine V.

Euchaeta tonsa, Giesbr.

Two females were found in townets on trawl at Helga CXX. They measured 4·95 and 5·25 mm. respectively, but agreed fairly well with Giesbrecht's description of the species, in the form of the genital protuberance, the number of setae (9) on the proximal outer lobe of the Maxilla, the length of the terminal antennal joints ($24 + 25 = 19$), and the absence of a tuft of hairs on the last thoracic segment.

Euchirella curticauda, Giesbr.

Three females and an immature male in the townets on trawl at Helga CXX.

Several other specimens of Euchirella, all immature males, also occurred, which could not be determined with certainty.

Euchaeta acuta, Giesbr.

A few were found in the mid-water nets at Porcupine V., and in the townets on trawl at Helga CXXI.

Euchaeta norvegica, Boeck.

Several specimens in mid-water net at Helga CXX. and townets on trawl at Helga CXX. and CXXI.

Immature specimens of Euchaeta, belonging to two or three different species, were found in most of the townettings examined.

Scolecithrix dentata, Giesbr.

Females were found in mid-water nets at Porcupine III. and V. and Helga CXX., and also in townets on trawl at Helga CXX.

Scolecithrix minor, Brady.

Females not uncommon in mid-water nets at Porcupine III. and V. and Helga CXX.

Scolecithrix pygmaea, T. Scott.

One specimen, male, in mid-water net at Porcupine III.

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Scolecithrix cristata, Giesbr.

Several females and a few males were found in the townets on trawl at Helga CXX.

Scolecithrix chelifer, I. C. Thomps.

One specimen, a female, from townets on trawl at Helga CXX.

The female of this rather remarkable looking copepod had not been taken previously; only the male having been met with by the describer, the late Mr. I. C. Thompson.*

I could find no trace of 5th feet in my specimen.†

The structure of the appendages of the female seems to be similar to those of the male. I give figures of the rostrum and 1st maxillipede (Pl. VII., Figs. 18–19), the details of which are not quite clear from Thompson's drawing.

Scolecithrix emarginata, n. sp.

(Pl. VII., Figs. 6–17).

Length of ♀, 4·3 mm.

Female.—Body elongate ovate, tapering very slightly anteriorly. 4th thoracic segment partially separated from 5th, the combined segments having an emarginate outline in lateral view, as found in *S. dentata*.

Abdomen short, measuring about ¼ of Cephalothorax, 4-segmented, anal segment very short. Genital. seg. a little longer than broad. 2nd and 3rd segments slightly broader than long.

Furcal rami almost as wide as long, divergent. The furcal setae were missing in my specimens.

1st Antennae (Pl. VII., Fig. 9) long, rather slender, just reaching beyond the furca. 23-jointed. Length, 4·7 mm.

Length of antennal joints in ·01 mm. :—

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.
24.	24.	12.	12.	12.	11.	10.	18	12.	14.	16.	24.	25.	25.	26.	25.	25.	25.	25.	23.	24.	23.	31.

2nd Antennae (Pl. VI., Fig. 10) of usual type, the exop. being slightly longer than endop., but with a row of fine curved setae on 1st basal.

Mandible not examined.

Maxilla (Pl. VII., Fig. 11) of usual type in *Scolecithrix*, 1st inner lobe rather longer than the spines it bears.

1st Maxillipede (Pl. VII., Fig. 12) resembles somewhat that in *S. cristata*, the sensory appendages being short and apparently with a small bud-like termination.

2nd Maxillipede (Pl. VII., Fig. 13) without a sensory appendage on 1st joint.

The feet are rather broad with fine spinulation on lower face.

1st foot (Pl. VII., Fig. 14) with terminal spine on outer edge of 1st joint of exop.

2nd foot (Pl. VII., Fig. 15).—Endop. 2nd joint with a proximal trans. row of fine spinules, a median row and a pair of distal spinules somewhat larger. Exop. 2nd joint with trans. distal row of fine spinules; 3rd joint with median and distal curved rows of similar spinules.

3rd foot (Pl. VII., Fig. 16).—Endop., 3rd joint with two trans. rows of moderate spinules; 3rd joint with median row of similar spinules and two large distal ones. Exop. 1st joint with distal trans. row; 2nd joint with two lateral rows on distal half joined by a trans. terminal row; 3rd joint with two lateral rows joined by median and distal transverse rows, all of small spinules. In addition to the spinulation on the lower face there are very minute spinules scattered over the upper face of most of the joints.

The spinulation on the 4th feet is much reduced.

* *Ann. and Mag. N. Hist.*, Ser. 7, Vol. XII.

† A 5th pair of feet have since been found in another specimen. They are 3-jointed, of the *Xanthocalanus* type. The cephalon is separate from the thorax, so the species must be referred to the genus *Xanthocalanus*.

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5th feet (Pl. VII., Fig. 17), 2-jointed with inner and terminal spines, the inner spine being about twice as long as the other, as in *S. auropecten*.

One mature and three immature specimens occurred in townets on trawl at Helga CXX.

Scolecithrix ovata, n. sp.

(Pl. VI., figs. 13–18; Pl. VII., figs. 1–5).

Length of female, 2·3 mm. Male unknown.

Cephalothorax regularly ovate in dorsal and lateral view; segments 4 and 5 of thorax joined; lateral margin slightly emarginate.

Abdomen slender, four segmented, about ¼ of Cephalothorax.

1st Antennae (Pl. VI., Fig. 14).—23-jointed, reaching to 2nd segment of abdomen; $l = 2{\cdot}24$ mm. Length of antennal joints in ·01 mm.:—

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.
12.	13.	7.	5.	6.	6.	5.	8.	6.	7.	7.	9.	10.	11.	11.	12.	12.	12.	12.	12.	11.	14.	16.

2nd Antennae (Pl. VI., Fig. 15), with exop. about 1⅓ times endop.

Mandible, with exop. only slightly larger than endop.

Maxilla (Pl. VI., Fig. 16), with 1st inner lobe well developed; the 2nd outer lobe appears to bear only five setae.

1st Maxillipede (Pl. VI., Fig. 17), with 5th lobe large in proportion to the rest; its spine is slender and slightly longer than that on the 4th lobe; sensory appendages rather long and slender.

2nd Maxillipede (Pl. VI., Fig. 18) has no noticeable features.

1st foot (Pl. VII., Fig. 1) with spine on outer edge of 1st joint of exop.

2nd foot (Pl. VII., Fig. 2). Exop. with transv. row of spinules distally on 2nd joint; 3rd joint with two lateral broken lines of minute spinules; endop. with two distal, two median, and two proximal spinules, moderately large, on 2nd joint.

3rd foot (Pl. VII., Fig. 3).—Exop. with distal row of small spinules on 2nd joint, and curved transv. median row on 3rd; endop. with three median and two distal spinules on 2nd joint, and two median and three distal large spinules on 3rd joint.

4th foot (Pl. VII., Fig. 4) with exop. and endop. missing in my specimen. The inner marginal spine of 1st basal is short and placed close to the junction of the 1st and 2nd basal joints.

5th foot (Pl. VII., Fig. 5) consists of a broad ovate lamellar joint arising from a small basal; it bears a short backward directed spine on its inner margin, and a more distal very short spine also on the inner margin.

This species, of which a single specimen was obtained in townets on trawl at Helga CXX., comes close in many points to *S. dentata*, but differs in the form of the feet and in the proportions of the cephalothorax and abdomen.

Scolecithrix echinata, n. sp.

(Pl. IV., Figs. 15–18; Pl. V., Figs. 12–17).

Length of female, 1·92. Male unknown.

Female.—Cephalothorax 1·56 mm.; abdomen, ·36.

Cephalothorax ovate elongate. Thorac. segs. 4 and 5 fused; abdomen of four segments; genital seg. slightly swollen, measuring about 1½ times the following segment; 2nd and 3rd segments equal, each slightly longer than anal seg.

Furcal rami 1½ times as long as broad.

1st Antennae (Pl. IV., Fig. 17) reach to the middle of last thoracic seg., stout, slightly setose, 22-jointed, $l = 1{\cdot}6$ mm.

Length of antennal joints in ·01 mm.:—

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.
17.	16.	6.	4.	4.	4.	4.	11.	4.	4.	5.	6.	6.	7.	8.	8.	7.	7.	7.	7.	8.	12.

2nd Antennae (Pl. IV., Fig. 18) resemble those in *S. cristata*, but the endop. is slightly longer in proportion to the exop.

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The mandible was badly mounted before examination, but seems to resemble that of *S. cristata*.

Maxilla (Pl. V., Fig. 12), like that of *S. cristata*; the endop. bears 7 setae, and the 1st inner lobe is proportionately more developed.

1st Maxillipede not well preserved, but approaches that of *S. brevicornis* in the length of the terminal pedicellated appendages, which bear bud-like terminations.

2nd Maxillipede as in *S. cristata*; the basal joint bears a sensory appendage, as in that species.

1st foot (Pl. V., Fig. 13) as in *S. brevicornis*.

2nd to 4th feet, while agreeing in shape with those of *S. brevicornis*, differ considerably in spinulation.

2nd foot (Pl. V., Fig. 14).—2nd joint of endop. with two large proximal and three smaller distal spinules; exop. with distal transverse row of spinules on 2nd joint, and two oblique curved rows of very small spinules on 3rd joint. The distal margin of 2nd joint of exop. also bears on the upper side a row of serrations.

3rd foot (Pl. V., Fig. 15) with exop. spinulated as in 2nd foot, endop. with three large curved spinules on 2nd joint and one small proximal and three larger distal spinules on 3rd joint.

The above spinules are all on the lower face of the joints.

4th foot (Pl. V., Fig. 16).—Exop. without spinules; endop. with four large spinules on lower face of 2nd joint, and a few very minute spinules on 3rd joint. The upper face of the endop. bears on its surface very minute spinules in one longitudinal row on 2nd joint, and in two rows on 3rd joint.

5th feet (Pl. V., Fig. 17) resemble those of *S. cristata* in form, but the inner edge spine does not reach to the end of the terminal one. This species is very closely allied to *S. brevicornis*, but differs in the shorter abdomen, which is contained 4 times in the length of the cephalothorax instead of 2½ times, in the spinulation of the endop. of the swimming feet, which consists of a few large spinules instead of numerous small ones, and in the form and comparative length of spines of 5th pair of feet.

One specimen occurred in the mid-water net at station Porcupine III.

Xanthocalanus borealis, G. O. Sars.

(Pl. VIII., Figs. 14–17.)

Several specimens, females, which are undoubtedly referable to this species, occurred at stations Porcupine IV. and Helga CXX. and CXXI., in all cases in townets on trawl or dredge. The largest of these reached 3·5 mm., and with them specimens of all sizes down to 2·5 mm. occurred, all apparently mature or nearly so. The larger specimens had 5th feet as figured by Sars for *X. borealis*;* the smaller, *i.e.*, from about 3 mm. downwards had 3-jointed 5th feet (Pl. VIII., Fig. 17), with a single terminal and two lateral spines on the last joint. In some instances the segmentation between the 2nd and 3rd joints was very incomplete or absent, thus approaching the immature form figured by Sars. The smaller specimens might, if they were regarded as mature, be referred to *X. fragilis* Aurivillius,† but it seems equally probable that they are specimens of *X. borealis* which have not undergone their final ecdysis at which the second terminal spine and the robust spinulation would probably be acquired. From 2·5 to 2 mm. other specimens occurred, which showed immature jointing of the abdomen, but appeared mature in other respects. These differed from the preceding in that the 5th thorac. seg. was separated from the 4th, and much contracted. The outline of the animal was short and broad, and resembled the figure given by Dr. T. Scott in 20th Report of the Scotch Fishery Board.‡ The 5th feet were the same as in specimens of 2·5 to 3 mm. It is possible that there may be two

* G. O. Sars, *Crustacea of Norway*, Pt. IV., Copepoda, Pl. XXXII.
† Aurivillius, *Konigl. Svenska Akad. Handl.* Band 30, No. 3.
‡ *20th Report of Scotch Fishery Board* Part IV. Pl.

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species included under these various forms, but in default of further information, it seems safer to regard them all as *X. borealis* at various stages of maturity.

The 5th feet of the mature *X. borealis* seem subject to variation both as regards jointing and number of spines. I have figured three of the forms which were met with in the collection. (Pl. VIII., Figs. 14–16.)

Xanthocalanus Greeni, n. sp.

(Pl. VIII., Figs. 1–13).

Length, female, 6·00 mm. Male unknown.

Body (Pl. VIII., Fig. 1) very robust, ovate, opaque. Thorac. seg. 4 and 5 coalesced, slightly produced posteriorly, lateral margins obtuse.

Abdomen very short, anal seg. retracted almost out of sight. Furcal rami broader than long. Furcal setae missing in my specimen.

1st Antennae (Pl. VIII., Fig. 2) stout, very sparingly setose, slightly longer than body, 24-jointed, $l = 6{\cdot}8$ mm. Length of antennal joints in ·01 mm. :—

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24
48.	48.	24.	24.	24.	24.	24.	32.	18.	20.	20.	24.	26.	30.	32.	32.	33.	33.	35.	28.	24.	30.	32.	17.

2nd Antenna (Pl. VIII., Fig. 3) with exop. slightly longer than endop. ; 1st joint of endop. comparatively long and slender.

Mandible (Pl. VIII., Fig. 4), cutting edge with numerous weak teeth.

Maxilla (Pl. VIII., Fig. 5) with long and narrow 1st inner lobe, bearing long razor-like spines ; 2nd inner lobe (not shown in figure) lies under third ; endop., small.

1st Maxillipede (Pl. VIII., Fig. 6) with strongly denticulate spine on 4th lobe ; the seta on 5th lobe is longer than the spine and almost as thick.

2nd Maxillipede (Pl. VIII., Fig. 7) short and stout, with one seta on each of the last four joints, strongly developed, and having a laminated edge.

1st to 4th feet (Pl. VIII., Figs. 9–12) jointed as in the genus.

Endop. of 2nd foot with two oblique rows of strong spinules on 2nd joint, one row of spinules on 2nd and 3rd joints of endop. of 3rd foot, and on 2nd joint of endop. of 4th foot.

The terminal spines of exop. of 2nd and 4th feet are broad and curved with finely denticulate lamina.

5th feet very small, 3-jointed, 3rd joint with one terminal and two lateral spines ; margins of 1st and 2nd joints with very minute spinules. The specimen appears to be not quite mature, so that the 5th feet, when fully developed, may be larger and more spinulose.

This form, the largest of the genus, was found, one specimen only, in the townets on the trawl at station Helga CXX. I have called it after the Rev. W. S. Green, the head of the Fisheries Branch.

Xanthocalanus pinguis, n. sp.

(Pl. VIII., Figs. 18-24 ; Pl. IX., Figs. 1–6).

Length of female, 4·5 mm. Male unknown.

Cephalothorax ovate, moderately robust. Thorac. seg. 1 imperfectly separated from cephalon. Thorac. segs. 4 and 5 separated, the latter produced laterally beyond the middle of gen. segment. The lateral processes swollen, ending bluntly, and filled with small oil globules.

Abdomen of four segments, anal seg. very short, caudal rami slightly longer than broad.

1st Antennae (Pl. VIII., Fig. 20) rather short, not reaching beyond Th. 4, moderately setose, decreasing rather abruptly in thickness after 8th joint, 23-jointed, length = 3·3 mm.

Length of antenna joints in ·01 mm. :—

1.	2.	3.	4.	5.	6.	7.	8	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.
32.	35.	14.	12.	14.	12.	12.	16	9.	10.	12.	13.	12.	14.	13.	12.	12.	12.	11.	11.	15.	16.	8.

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2nd Antenna (Pl. VIII., Fig. 21) with both exop. and endop. rather short and broad.

Mandible (Pl. VIII., Fig. 22) presents no noticeable features.

Maxilla (Pl. VIII., Fig. 23) with elongate and slender exop. and endop.; the distal spines on the 1st inner lobe are longer than the more proximal. 1st and 2nd maxillipedes (Pl. VIII., Fig. 24, Pl. IX., Fig. 1) of the usual type found in the genus.

1st foot (Pl. IX., Fig. 2), typical.

2nd foot (Pl. IX., Fig. 3), 2nd joint of endop. with a proximal row of very long spinules and a distal group of somewhat shorter ones. Endop. of 3rd foot (Pl. IX., Fig. 4) with row of very long spinules on 2nd joint, and curved row of smaller spinules on 3rd joint.

4th foot (Pl. IX., Fig. 5) with a few small distal spinules on 2nd joint of endop. All the feet rather slender, with long finely denticulate terminal spines.

5th feet (Pl. IX., Fig. 6), 3-jointed; 3rd joint with two terminal and two lateral spines, the face of the joint being minutely spinulose; 2nd joint with a few spinules distally on outer margin; 1st joint with inner margin minutely spinulose.

A single specimen was found in townets on trawl at Helga CXX.

Xanthocalanus obtusus, n. sp.

(Pl. IX., Figs. 10–19).

Length of female, 2·4 mm. Male unknown.

Cephalothorax ovate, robust. Cephalon separated from 1st thoracic seg. Segs. 4 and 5 of thorax separated. 5th segment very short, swollen, obtuse. Abdomen short, of four segments; gen. seg. about as broad as long; anal seg., very short; furcal rami, slightly longer than broad.

1st Antennae (Pl. IX., Fig. 12) reach the middle of the genital seg.; 24-jointed; length = 2·22 mm.

Length of antennae joints in ·01 mm.:—

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20	21.	22.	23.	24.
14.	16.	8.	7.	7.	7.	7.	12.	6.	7.	8.	10	9·	11.	11.	10.	10.	8.	8.	8.	8.	10.	12.	8.

2nd Antennae (Pl. IX., Fig. 13), as in the genus.

Mandible, cutting edge with weak, finely-divided teeth, palp as usual.

Maxilla (Pl. IX., Fig. 14), 1st inner lobe shorter and broader than is usual in the genus.

1st Maxillipede (Pl. IX., Fig. 15) presents no unusual features.

2nd Maxillipede has a short bud-bearing sensory filament on 1st joint.

1st foot (Pl. IX., Fig. 16), as usual in the genus.

2nd foot (Pl. IX., Fig. 17) with 2nd joint of exop. minutely spinulose on lower face; endop., 2nd joint with two curved rows of long spinules on the inner face near the outer edge.

3rd foot (Pl. IX., Fig. 18).—Exop. with inner face of 2nd and 3rd joints minutely spinulose; endop., 2nd and 3rd joints with long spinules near the outer margin; the outer margin of the 2nd joint bears a row of smaller spinules; 1st basal with a distal transverse row of spinule.

4th foot.—Endop. spinulose, as in 3rd, and has in addition minute spinules over the lower face of the joint.

5th foot (Pl. IX., Fig. 19).—Three-jointed, 2nd joint being the largest. 1st joint bears coarse spinules distally on inner margin, 2nd joint with both margins spinulose, 3rd joint with two terminal and two lateral spines, the face of the joint being minutely spinulose. The 2nd to 4th feet are rather short and stout, and have the lamina of the terminal spines coarsely denticulate.

The most noticeable differences between this and the other species of the genus are the short obtuse 5th thorac. seg., and the form of the 5th pair of feet,

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Xanthocalanus, sp., ♂.

(Pl. IX., Figs. 7–9; Pl. XI., Fig. 11).

Only two male specimens of Xanthocalanus were met with in the collection, one at Porcupine IV. and one at Helga CXXI. They were both the same species, one measuring 2·27 mm., and the other 2·2 mm., and do not seem identical with any described species of male, though coming very close to *X. agilis*, and to the form described by Dr. T. Scott as *Phaenna zetlandica* ♂.* The 5th feet were 5-jointed on either side, and resembled somewhat those of *Phaenna spinifera* ♂.

1st Antennae 18-jointed on both sides in one specimen; in the other one antenna was 17-jointed; the jointing of the other was not noted. The antennae were longer than the body by about two joints. I have not put a name to this form as it is not clear to me whether it should be referred to one of the above females.

Genus **Brachycalanus**, n. gen.

This genus is closely allied to Xanthocalanus and differs mainly in shape of the rostrum, which forms a broad truncated plate, and in the extreme shortness of the 1st antennae.

The mouth parts and feet in the female resemble those found in Xanthocalanus, the vermiform sensory filaments being present in the 1st maxillipedes and the spinous armature on the swimming feet. The cephalon and 1st thoracic segment are separated. The form of the body is robust, and the abdomen short, with broad free margins to its segments.

Brachycalanus atlanticus (Wolfenden).

(Pl. X., Figs. 1–14).

Length of female, 2·0—2·5 mm. Male unknown.

Body (Pl. X., Fig. 1-2) robust ovate; Cephalon separated from Th. 1; Th. 4 and Th. 5 separate; the latter somewhat produced laterally with rounded margin.

Rostrum (Pl. X., Fig. 3) short, broad, square-cut in front, probably with filaments at the angles, though these were absent in my specimens.

Abdomen short, 4-segmented; genital seg. equal to the two following; anal seg. very short, almost concealed by the preceding; furcal rami as broad as long; setae missing in my specimens.

1st Antennae (Pl. X., Fig. 4) only reach to beginning of 3rd thor. seg.; very thick at base; 24-jointed; length, 1·45 mm.

Length of antennal joints in ·01 mm.:—

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19	20.	21.	22.	23.	24
18.	12.	6.	5.	6.	5.	5.	7.	4.	4.	4.	5.	5.	6.	6.	7.	7.	6.	6.	6.	6.	8.	10.	3.

2nd Antennae (Pl. X., Fig. 5) short, broad; exop. longer than endop.

Mandible (Pl. X., Fig. 6) as in Xanthocalanus; cutting edge not examined.

Maxilla (Pl. X., Fig. 7).—1st inner lobe narrower than in Xanthocalanus; endop. long and slender.

1st Maxillipede (Pl. X., Fig. 8) with strong spine on 5th lobe, that on 4th lobe much weaker; sensory filaments as in Xanthocalanus.

2nd Maxillipede (Pl. X., Fig. 9) has the structure found in Xanthocalanus.

1st foot (Pl. X., Fig. 10), as in Xanthocalanus.

2nd foot (Pl. X., Fig. 11).—Endop. with three spinules on 1st joint; two rows of similar spinules diagonally on 2nd joint. Exop. with three spinules on lower face of 1st joint and three smaller spinules on its outer edge; there is one spinule, probably more, on the inner edge of 2nd joint; terminal spine with coarsely denticulate lamina.

* *20th Report of Scotch Fishery Board*, Part III., p. 453.

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3rd foot (Pl. X., Fig. 12).—Endop. 2nd joint with a diagonal row of spinules, and a row of smaller spinules parallel to inner margin; 3rd joint with diagonal and parallel row, as in 2nd joint; two small spinules on inner face of 1st joint of exop.

4th foot (Pl. X., Fig. 13) with outer and inner margins of 1st basip, strongly spinulose; inner edge seta, short; 1st joint of endop. with a few small spinules, 2nd joint with one, probably more, 3rd joint with three spinules distally near the inner margin.

5th feet (Pl. X., Fig. 14), 3-jointed; 3rd joint long, with two terminal and two lateral spines; all the joints densely covered with moderately small spinules.

Three specimens of this species were washed from sand brought up by a townet on the trawl at Helga CXXI. They measured 2·5, 2·0, and 1·52 mm., respectively. The description is taken from the largest specimen, except as regards the 5th pair of feet, which were only found in the smallest specimen, which, while appearing fully developed in other respects, still showed immature segmentation of the abdomen.

[While the above was in the press a description of this species, under the name of *Xanthocalanus atlanticus*, was published by Dr. Wolfenden.* I have accordingly altered the specific name to correspond, while retaining the generic name here given.]

Genus **Oöthrix**, n. gen.

This genus resembles Xanthocalanus in most respects. It differs, however, in the form of the rostrum, which resembles that found in Brachycalanus, in the 1st maxillipede, in which the two terminal sensory filaments are short and sausage-shaped instead of being longer than the rest, and the spines on the 4th and 5th lobes are slender, and in the absence of spinulation on the under side of the swimming feet. The antennae are 24-jointed and reach nearly to the end of the cephalothorax. The cephalon is separated from the 1st thoracic seg. The 4th and 5th thoracic segments are separate, the latter being produced on either side into a pair of equal sharp spines.

Oöthrix bidentata, n. sp.

(Pl. X., Figs. 15–18; Pl. XI., Figs. 1–10).

Length of female, 3·0 mm.

Cephalon separated from Th. 1; Th. 4 and 5 separated; the latter produced into two sharp spines on either side.

1st Antenna (Pl. X., Fig. 17), 24-jointed, reaching to 5th thorac. seg.; length, 2·3 mm. Length of antennal joints in ·01 mm.:—

1	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23	24.
16.	12.	5.	5.	6.	6.	6.	11.	6.	7.	8.	9.	10.	12.	12.	12.	12.	13.	14.	12.	11.	12.	10.	6.

2nd Antenna (Pl. X., Fig. 18) somewhat shorter than in Xanthocalanus; exop. slightly longer than endop.

Mandible (Pl. XI., Fig. 1).—Palp as in Xanthocalanus; the cutting edge was lost in mounting. In another specimen (Pl. IV., Fig. 2), referred to below, the cutting edge was armed with long semi-articulate spines.

Maxilla (Pl. XI., Fig. 3) as in Xanthocalanus.

1st Maxillipede (Pl. XI., Fig. 4) with long and fragile sensory filaments; the two terminal filaments are short and swollen; spines on 4th and 5th lobes, long and slender.

2nd Maxillipede (Pl. XI., Fig. 5), as in Xanthocalanus.

1st foot (Pl. XI., Fig. 6) of the form found in Xanthocalanus; the 2nd basal bears on its lower face three small spinules at the base of the endop.

* *Jour Mar. Biol. Assoc.*, N. S. Vol. VII. No. 1, April, 1904, p. 119.

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2nd foot (Pl. XI., Fig. 7) with three spinules on 2nd basal, as in 1st foot; terminal spine of exop. longer than 3rd joint; finely denticulate.

3rd foot (Pl. XI., Fig. 8) with short spinule on 1st basal near its inner edge, and three spinules on 2nd basal; the terminal spine of exop. is a little shorter than the 3rd joint.

4th foot imperfect; it lacks the spinules on 2nd basal.

5th foot (Pl. XI., Fig. 9), 3-jointed both sides; third joint long and narrow, setose on the outer margin, with two terminal and two lateral spines; 2nd joint setose on outer margin.

One specimen of the above was found in the sand brought up by a townet on the trawl at Helga CXXI. Its abdomen showed immature jointing, but it seemed to be fully developed in other respects. In the townets on the trawl at Helga CXX., there occurred two immature specimens of what seems to be a closely allied, if not identical, species. They measured 3·35 mm., and appeared to be immature females, though the structure of the 5th pair of feet (Pl. XI., Fig. 10) resembles somewhat that of a ♂. I have referred to them in the explanation of plates as sp. B.

Phaenna spinifera, Cls.

Two specimens occurred; one ♂ in mid-water net at Porcupine V., and one ♀ in townet on trawl at Helga CXX.

CENTROPAGIDAE.

Centropages typicus, Kröyer.

A few specimens were found at stations Porcupine III. and V.

Temora longicornis, Müll.

Occurred once, in mid-water net, at station Helga CXX.

Metridia lucens, Boeck.

Was found in most of the townets at the Porcupine stations; also in mid-water net at Helga CXX., and townets on trawl at Helga CXX. and CXXI.

Metridia venusta, Giesbr.

Five females, measuring 2·8 to 2·9 mm., and one which only reached 2·52 mm., were found in townets on trawl at Helga CXX. They agreed closely with Giesbrecht's description. They might be equally well referred to the unknown female of *M. Normani* if the recorded distribution of the two species were taken into account.

Thompson's record of *M. venusta* ♂ from the North Atlantic* evidently refers to a species of Heterorhabdus, perhaps *H. longicornis*.

Metridia princeps, Giesbr.

One specimen, female, length 7·65 mm., in townets on trawl at Helga CXX.

Pleuromamma robusta (F. Dahl).

Scarce at Porcupine IV. and V., and rather more plentiful at Helga CXX. and CXXI., in townets on trawl.

Lucicutia flavicornis (Cls.).

One specimen, female, in mid-water net at Porcupine III.

* *Ann. and Mag. N. Hist.* Ser. 7 Vol. XII.

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Lucicutia curta, n. sp.

(Pl. XII., Figs. 1–7.)

Length of female 2·4 mm. Cephalothorax 1·75 mm. Abdomen ·65 mm. Male unknown.

Body (Pl. XII., Figs. 1–2) robust ovate, slightly tapered anteriorly. Rostrum not visible in dorsal view. Cephalon separated from Th. 1; Th. 4 and 5 fused; lateral margins of 5th seg. rounded.

Abdomen, 4-segmented; genital seg. equal to the two following; strongly swollen ventrally; furcal rami four times as long as broad.

1st Antennae (Pl. XII., Fig. 3) slightly longer than body; 24-jointed, with very small and inconspicuous aethetasks; length, 2·3 mm.

Length of antenna joints in ·01 mm.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24
8.	8.	8.	4.	5.	5.	6.	6.	6.	7.	7.	10.	11.	12.	14.	15.	16.	17.	14.	13.	13.	13.	14.	7.

2nd Antennae with no noticeable features.

Mandible.—2nd joint of endop. longer and slenderer than in *L. flavicornis*; cutting edge with four strong teeth, followed by six weaker ones.

Maxilla, as in *L. flavicornis*.

1st Maxillipede resembles that of *L. flavicornis*; on the proximal side of the 1st lobe there are two moderately long setae directed backwards.

2nd Maxillipede, as in *L. flavicornis*.

1st to 4th swimming feet with 3-jointed exop. and endop.

1st foot (Pl. XII., Fig. 4) with short cylindrical process near inner edge of 2nd basal; terminal spine of exop. longer than the 3rd joint.

2nd foot (Pl. XII., Fig. 5) exop., with terminal spine half as long as 3rd joint.

3rd foot (Pl. XII., Fig. 6) resembles 2nd; there is a small papilla on the 3rd joint of exop., situated about the middle of the anterior third of the joint.

4th foot broken in my specimen.

5th foot (Pl. XII., Fig. 7), outer edge spines of exop. longer and slenderer than in *L. flavicornis*. Terminal spine contained 1⅓ times in 3rd joint. This species seems intermediate between *L. flavicornis* and *L. longicornis*. It differs from the latter in its larger size; stouter body, with shorter abdomen; shorter caudal rami and shorter antennae.

Two specimens were found in the townets on trawl at station Helga CXX.

Lucicutia atlantica (Wolfenden). ?

A single specimen of a female Lucicutia, length 3·5 mm., with long antennae and furcal rami, was found in the townet on the dredge at station Porcupine IV. As it seemed to come very near to *Lucicutia magna* ♂, I forwarded drawings of it to Dr. Wolfenden, who kindly informed me that it seemed to be the same as a female Lucicutia which he had taken in the eastern Atlantic, and which he proposed, in a forthcoming paper, to call *L. atlantica*, though doubtful whether it might not turn out to be the female of *L. magna*.

As my specimen seems to differ from *L. atlantica* in a few small points, I have thought it better to give a few figures. (Pl. XIII., Figs. 5–10.)

Heterorhabdus spinifrons (Cls.).

One specimen, a male, *l.* 3·4 mm., occurred in the townets on the trawl at station Helga CXX. Its length is somewhat greater than that mentioned by Giesbrecht, but it seems to agree in other respects.

Heterorhabdus norvegicus (Boeck.).

A few specimens, both male and female, were found at stations Helga CXX. and CXXI.

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Heterorhabdus abyssalis (Giesbr.)?

Several specimens of a small female Heterorhabdus, *l.* 2·4 mm., were met with at stations Helga CXX. and Porcupine IV., in townets on the dredge or trawl in both instances. They belong to the section of the genus represented by *H. papilliger*, but do not agree with any of the described females. The 1st antennae are longer than the body by about three joints. The innermost of the three terminal spines of the 1st maxillipede is the shortest. The shortest of the three spines of the preceding lobe is more than half the length of the two others. The spine on the end of the inner edge of the 1st joint of the 2nd maxillipede is short and stout, as in *H. papilliger*; the setae on the 2nd joint are as in *H. papilliger*. The setae on the inner edge of 1st and 2nd joints of endop. of 5th foot are very slender, as in *H. clausi*, but the spine on the inner edge of 1st joint of exop., which is found in that species, is absent. It is not possible to be certain of the species until the male has been met with, but the longer 1st antennae and small size seem to indicate that it probably is the female of *H. abyssalis*.

Heterorhabdus vipera (Giesbr.).

Four males, measuring from 3·4 to 3·7 mm., were found in the townets on the trawl at Helga CXX.

Heterorhabdus longicornis (Giesbr.).

Two females of this species, measuring 3·35 and 3·5 mm., were met with in the townets on the trawl at Helga CXX. In the same haul were two males, *l.* 4·15 and 4·2, of the *H. longicornis* type, which, though considerably larger than the females, yet are probably referable to the same species. They agree closely, except in size, with the species described by Dr. Wolfenden as *H. zetesios*,* which, he informs me, he now regards as the male of *H. longicornis*.

It may be, however, that my specimens belong to the imperfectly-described *H. major* of Dahl.

Haloptilus longicornis (Cls.).

One specimen in a bottom townet at station Porcupine V.

Haloptilus acutifrons (Giesbr.).

One rather battered specimen, *l* 2·64 mm., in townets on the trawl at station Porcupine IV.

An immature and imperfect ♂ *l.* 3·7, with rounded head, which was found in mid-water net at Helga CXX. perhaps belongs to *H. fertilis*.

Phyllopus bidentatus, Brady.

I have included under this name three specimens of Phyllopus—two females and a male. The two females differ in size, form of thoracic segments, and 5th feet, from each other, and from the specimens described by Brady and Giesbrecht. One, *l.* 3·0 mm., has a symmetrical 5th Th. seg., produced into a point on either side, as in the specimen figured by Dr. T. Scott from the Gulf of Guinea.† It also resembles that specimen in its 5th feet, which are short and strong and bear no seta on their 2nd basal joint.

The other, measuring 2·4 mm., has 5th thoracic seg. symmetrical and rounded laterally. The 5th feet are more slender and have an outer edge seta on 2nd basal joint.

* *Journ. Mar. Biol. Assoc.*, N.S. Vol. VI., No. 3 (Jan., 1902), p. 367.
† *Tr. Linn. Soc. Lond.*, Ser. 2, Vol. 6.

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The relative proportions of the 1st antennae joints differ slightly in the two specimens, joints 13 and 14 being relatively much shorter in the smaller specimen.

As far as it is possible to judge from the very few specimens which have been figured or recorded, all these different forms seem to belong to one remarkably variable species, a very unusual occurrence amongst the copepoda.

The male of this species has been recorded from the N. Atlantic and in part figured by the late Mr. I. C. Thompson,* but as his figures differ somewhat from mine, I have drawn the appendages in which the male differs from the female. The 1st antenna on the right side is identical in both sexes.

CANDACIIDAE.

Candacia norvegica, Boeck.

Two females were found in the townets on the trawl at station Helga CXX.

PONTELLIDAE.

Acartia Clausi, Giesbr.

Occurred more or less abundantly at all the Porcupine stations and in the mid-water net at Helga CXX. A few specimens which were found in the townets on the trawl at Helga CXXI., may have been taken on the way up.

CYCLOPIDAE.

Oithona similis (Cls.).

Found in most of the nets, both surface and bottom, on the Porcupine stations.

Oithona plumifera (Baird).

Found, like the last, in small or moderate numbers at most of the Porcupine stations.

HARPACTICIDAE.

Microsetella atlantica (Brady and Rob.).

Single specimens occurred twice, at Porcupine III. and V., and may have been overlooked in other instances.

Aegisthus mucronatus (Giesbr.).

One specimen, which seems to belong to this species, length 1·86 mm., caudal seta 9·15 mm., was found in the townets on the dredge at station Porcupine IV.

Aegisthus spinulosus, n. sp.

(Pl. XII., Figs. 8–14; Pl. XIII., Figs. 1–4).

Female—*l.* 1·74; length of caudal seta 1·92.

Form of body as in *A. aculeatus*, but segmentation between 1st and 2nd abdominal segments complete, and head without chitinous reticulations. Posterior margin of 2—4 thorac. seg. and 2—5th abd. segs., denticulate.

* *Ann. and Mag. N. Hist.*, Ser. 7, Vol. XII.

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1st antenna (Pl. XII., Fig. 10), 7-jointed; a long aesthetask on 3rd and a shorter one on 7th joint.

Proportional length of joints in ·01 mm. :—

1.	2.	3.	4.	5.	6.	7.
24.	25.	18.	14.	3.	3.	5

2nd Antenna as in *A. aculeatus*, with long 2nd basal bearing distally a long exop. and proximally a very short endop.

Mandible (Pl. XII., Fig. 11), cutting edge with five teeth and one seta; there is a small 2nd basal and two-jointed exop. present, the latter with two terminal setae.

Maxilla (Pl. XII., Fig. 12) as in *A. aculeatus*.

1st Maxillipede (Pl. XII., Fig. 13) of the same form as in *A. aculeatus*; 1st inner lobe bears five setae; 2nd inner lobe with three setae; 3rd and 4th inner lobes with three setae each; and 5th inner lobe with a larger, regularly-shaped falcate spine.

2nd Maxillipede (Pl. XIII., Fig. 2) resembles that of *A. aculeatus*.

1st feet (Pl. XII., Fig. 14) resemble those of *A. aculeatus*; the spinulations on the surface of the joints seem to be absent.

The segmentation between joints 2 and 3 of the endop. is only faintly indicated.

2nd to 4th feet as in *A. aculeatus*.

5th feet (Pl. XIII., Fig. 3) resemble those of *A. aculeatus*, but seem to differ slightly in the form of the spines.

6th feet with two short equal terminal setae.

This species comes very close to *A. aculeatus*, but differs in the absence of chitinous reticulation, shorter caudal setae, complete division of genital segment, proportional length of 4th joint of 1st antenna, presence of an exop. on mandible, and of two equal setae on 6th foot.

One specimen was found in the townets on the trawl at station Helga CXX.

Idya furcata (Baird).

One specimen was found in the townets on the trawl at Helga CXXI. This species, usually taken in shallow water, has recently been recorded by Dr. T. Scott* from a depth of 87 fath. in the Faroe Channel, and the present record considerably extends its bathymetric range. Not being well acquainted with the genus, I submitted drawings of this specimen to Mr. A. Scott, who agrees with me in thinking that it should be referred to one of the forms of *Idya furcata*.

ONCAEIDAE.

Oncaea conifera, Giesbr.

Occurred in small numbers at most of the Porcupine stations, and in the mid-water net at Helga CXX.

Conaea rapax, Giesbr.

One specimen in bottom townet at Porcupine III.

* *Journal Linn. Soc.*, Vol. XXIX.

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EXPLANATION OF PLATES III.-XIII.

The figures were all drawn by means of a *camera lucida*.

Plate III.

Spinocalanus magnus, Wolfenden.

Fig. 1.—Female, dorsal view.
Fig. 2. ,, lateral view.
Fig. 3. ,, 1st antenna, ... × 39
Fig. 4. ,, 2nd antenna, ... × 88
Fig. 5. ,, mandible palp, ... × 75
Fig. 6. ,, maxilla, ... × 138
Fig. 7. ,, 1st maxillipede, ... × 138
Fig. 8. ,, 2nd maxillipede, ... × 88
Fig. 9. ,, 1st foot, ... × 88
Fig. 10. ,, 2nd foot, ... × 88
Fig. 11. ,, 3rd foot, ... × 88
Fig. 12. ,, 4th foot, basal joint, ... × 138

Bradyetes inermis, n. sp.

Fig. 13.—Female, lateral view.
Fig. 14. ,, dorsal view.
Fig. 15. ,, 1st antenna, ... × 58
Fig. 16. ,, 2nd antenna, ... × 75
Fig. 17. ,, maxillae, ... × 160
Fig. 18. ,, 2nd maxillipede, ... × 58
Fig. 19. ,, 1st foot, ... × 116
Fig. 20. ,, 2nd foot, ... × 75

Plate IV.

Bryaxis minor, n. sp.

Fig. 1.—Female, lateral view, ... × 53
Fig. 2. ,, dorsal view, ... × 53
Fig. 3. ,, 1st antenna, ... × 98
Fig. 4. ,, 2nd antenna, ... × 88
Fig. 5. ,, 2nd antenna, exopodite, ... × 245

Bryaxis brevicornis, G. O. Sars.

Fig. 6.—Female, 2nd antenna, exopodite, ... × 245

Bryaxis minor, n. sp.

Fig. 7.—Female, maxilla, ... × 245
Fig. 8. ,, 1st maxillipede, ... × 245
Fig. 9. ,, 2nd maxillipede, ... × 88
Fig. 10. ,, 1st foot, ... × 113
Fig. 11. ,, 2nd foot, ... × 113
Fig. 12. ,, 3rd foot, ... × 113

Bradyetes inermis, n. sp.

Fig. 13.—Female, 3rd foot, ... × 75
Fig. 14 ,, 4th foot, ... × 75

Scolecithrix echinata, n. sp

Fig. 15.—Female, lateral view, ... × 53
Fig. 16. ,, dorsal view, ... × 53
Fig. 17. ,, 1st antenna, ... × 100
Fig. 18. ,, 2nd antenna, ...

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Plate V.

Gaetanus minor, n. sp.

Fig. 1.—Female, dorsal view, ... × 34
Fig. 2. ,, lateral view, ... × 34
Fig. 3. ,, 1st antenna, ... × 58
Fig. 4. ,, 2nd antenna, ... × 104
Fig. 5. ,, maxilla, ... × 250
Fig. 6. ,, 1st maxillipede, ... × 104
Fig. 7. ,, 2nd maxillipede, ... × 84
Fig. 8. ,, 1st foot, ... × 84
Fig. 9. ,, 2nd foot, ... × 84
Fig. 10. ,, 3rd foot, ... × 84
Fig. 11. ,, 4th foot, ... × 84

Scolecithrix echinata, n. sp.

Fig. 12.—Female, maxilla, ... × 295
Fig. 13. ,, 1st foot, ... × 128
Fig. 14. ,, 2nd foot, ... × 128
Fig. 15. ,, 3rd foot, ... × 128
Fig. 16. ,, 4th foot, ... × 128
Fig. 17. ,, 5th foot, ... × 295

Plate VI.

Gaetanus Holti, n. sp.

Fig. 1.—Female, dorsal view.
Fig. 2. ,, lateral view.
Fig. 3. ,, 1st antenna, ... × 28
Fig. 4. ,, 2nd antenna, ... × 50
Fig. 5. ,, mandible cutting edge, ... × 104
Fig. 6. ,, maxilla, ... × 67
Fig. 7. ,, 1st maxillipede, ... × 67
Fig. 8. ,, 2nd maxillipede, ... × 50
Fig. 9. ,, 1st foot, ... × 50
Fig. 10. ,, 2nd foot, ... × 50
Fig. 11. ,, 3rd foot, ... × 50
Fig. 12. ,, 4th foot, ... × 50

Scolecithrix ovata, n. sp.

Fig. 13.—Female, lateral view, ... × 34
Fig. 14. ,, 1st antenna, ... × 57
Fig. 15. ,, 2nd antenna, ... × 92
Fig. 16. ,, maxilla, ... × 260
Fig. 17. ,, 1st maxillipede, ... × 260
Fig. 18. ,, 2nd maxillipede, ... × 135

Plate VII.

Scolecithrix ovata, n. sp.

Fig. 1.—Female, 1st foot, ... × 92
Fig. 2. ,, 2nd foot, ... × 92
Fig. 3. ,, 3rd foot, ... × 92
Fig. 4. ,, 4th foot, basal joints, ... × 88
Fig. 5. ,, 5th foot, ... × 260

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Scolecithrix emarginata, n. sp.

Fig. 6.—Female, lateral view, ... × 21
Fig. 7. ,, dorsal view, ... × 21
Fig. 8. ,, rostrum, ... × 58
Fig. 9. ,, 1st antenna, ... × 31
Fig. 10. ,, 2nd antenna, ... × 58
Fig. 11. ,, maxilla, ... × 93
Fig. 12. ,, 1st maxillipede, ... × 107
Fig. 13. ,, 2nd maxillipede, ... × 209
Fig. 14. ,, 1st foot, ... × 58
Fig. 15. ,, 2nd foot, ... × 58
Fig. 16. ,, 3rd foot, ... × 58
Fig. 17. ,, 5th foot, ... × 122

Scolecithrix chelifer, I. C. Thomps.

Fig. 18.—Female, head, ... × 27
Fig. 19. ,, 1st maxillipede, ... × 43

Plate VIII.

Xanthocalanus Greeni, n. sp.

Fig. 1.—Female, dorsal view, ... × 14
Fig. 2. ,, 1st antenna, ... × 21·5
Fig. 3. ,, 2nd antenna, ... × 46
Fig. 4. ,, mandible palp, ... × 46
Fig. 5. ,, maxilla, ... × 46
Fig. 6. ,, 1st maxillipede, ... × 32
Fig. 7. ,, 1st maxillipede, terminal joints, . . . × 120
Fig. 8. ,, 2nd maxillipede, ... × 28
Fig. 9. ,, 1st foot, ... × 28
Fig. 10. ,, 2nd foot, ... × 28
Fig. 11. ,, 3rd foot, ... × 28
Fig. 12. ,, 4th foot, ... × 28
Fig. 13. ,, 5th foot, ... × 68

Xanthocalanus borealis, G. O. Sars.

Fig. 14.—Female, 5th foot, typical form . . . . . × 154
Fig. 15. ,, ,, variety, ... × 154
Fig. 16. ,, ,, ,, ... × 154
Fig. 17. ,, immature 5th foot, ... × 154

Xanthocalanus pinguis, n. sp.

Fig. 18.—Female, lateral view.
Fig. 19. ,, dorsal view.
Fig. 20. ,, 1st antenna, ... × 39
Fig. 21. ,, 2nd antenna, ... × 39
Fig. 22. ,, mandible palp, ... × 50
Fig. 23. ,, maxilla, ... × 68
Fig. 24. ,, 1st maxillipede, ... × 68

Plate IX.

Xanthocalanus pinguis, n. sp.

Fig. 1.—Female, 2nd maxillipede, ... × 39
Fig. 2. ,, 1st foot, ... × 39
Fig. 3. ,, 2nd foot, ... × 39
Fig. 4. ,, 3rd foot, ... × 39
Fig. 5. ,, 4th foot, endop. and basal joints, . . . × 39
Fig. 6. ,, 5th foot, ... × 68

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Xanthocalanus sp.

Fig. 7.—Male.
Fig. 8. ,, 5th feet, ... × 110
Fig. 9. ,, terminal joints of left 5th foot.

Xanthocalanus obtusus, n. sp.

Fig. 10.—Female, lateral view, ... × 41·5
Fig. 11. ,, dorsal view, ...
Fig. 12. ,, 1st antenna, ... × 70
Fig. 13. ,, 2nd antenna, ... × 83
Fig. 14. ,, maxilla, ... × 148
Fig. 15. ,, 1st maxillipede, ... × 98
Fig. 16. ,, 1st foot, ... × 83
Fig. 17. ,, 2nd foot, ... × 83
Fig. 18. ,, 3rd foot, ... × 83
Fig. 19. ,, 4th foot, ... × 148

PLATE X.

Brachycalanus atlanticus (Wolfenden).

Fig. 1.—Female, lateral view, ... × 40
Fig. 2. ,, dorsal view, ... × 40
Fig. 3. ,, rostrum, ... × 70
Fig. 4. ,, 1st antenna, ... × 92
Fig. 5. ,, 2nd antenna, ... × 92
Fig. 6. ,, mandible palp, ... × 92
Fig. 7. ,, maxilla, ... × 140
Fig. 8. ,, 1st maxillipede, ... × 140
Fig. 9. ,, 2nd maxillipede, ... × 92
Fig. 10. ,, 1st foot, ... × 92
Fig. 11. ,, 2nd foot, ... × 92
Fig. 12. ,, 3rd foot, ... × 92
Fig. 13. ,, 4th foot, ... × 92
Fig. 14. ,, 5th foot, ... × 310

Oöthrix bidentata n. sp.

Fig. 15.—Female, lateral view, ... × 30
Fig. 16. ,, rostrum, ... × 50
Fig. 17. ,, 1st antenna, ... × 50
Fig. 18. ,, 2nd antenna, ... × 80

PLATE XI.

Oöthrix bidentata, n. sp.

Fig. 1.—Female, mandible palp, ... × 80
Fig. 2. ,, sp. B. mandible, cutting edge, ... × 290
Fig. 3. ,, maxilla, ... × 142
Fig. 4. ,, 1st maxillipede, ... × 142
Fig. 5. ,, 2nd maxillipede, ... × 80
Fig. 6. ,, 1st foot, ... × 80
Fig. 7. ,, 2nd foot, ... × 80
Fig. 8. ,, 3rd foot, ... × 80
Fig. 9. ,, 5th foot, ... × 142
Fig. 10. ,, sp. B. 5th foot, ... × 106

Xanthocalanus sp.

Fig. 17.—Male, 3rd foot, ... × 71

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Phyllopus bidentatus, Brady.

Fig. 12. — Male, dorsal view, ... × 25
Fig. 13. ,, lateral view, ... × 25
Fig. 14. ,, rostrum.
Fig. 15. ,, thoracic segments, lateral view.
Fig. 16. ,, 1st antenna, ... × 68
Fig. 17. ,, maxilla, ... × 134
Fig. 18. ,, 5th foot, left, ... × 90
Fig. 19. ,, 5th foot, right, ... × 90
Fig. 20.—Female, 5th foot, ... × 134
Fig. 21. ,, 5th foot, another specimen, ... × 234

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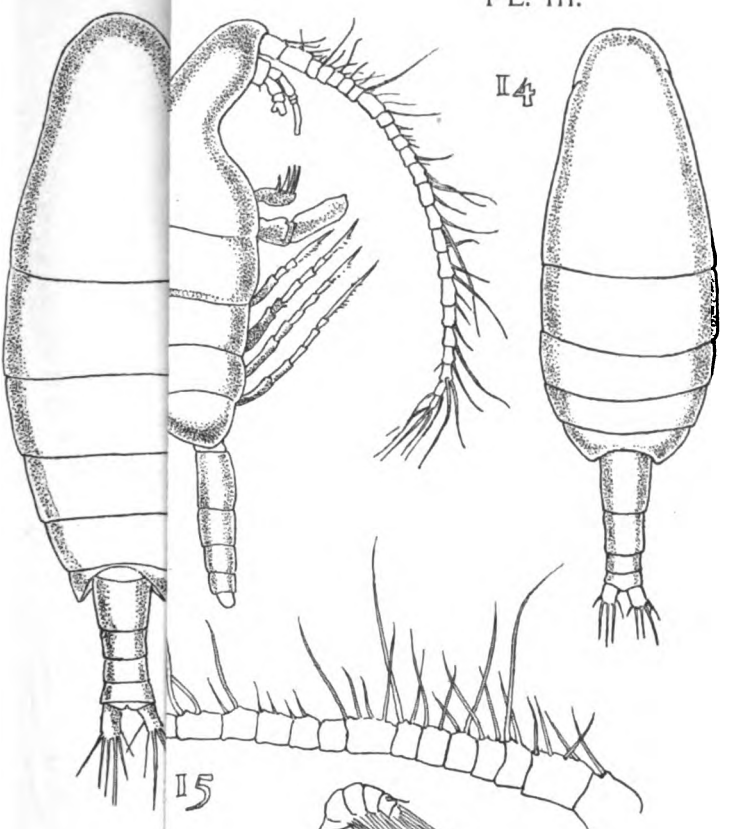
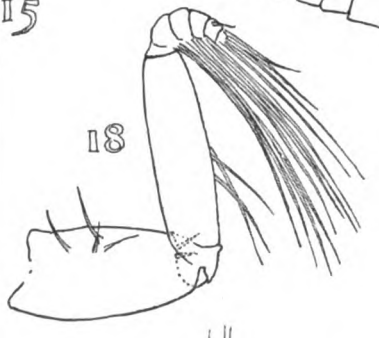
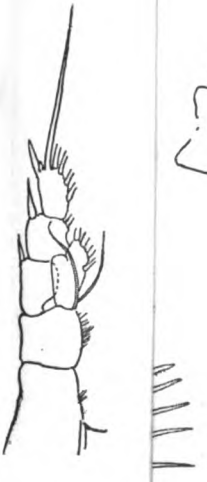
PL. III.







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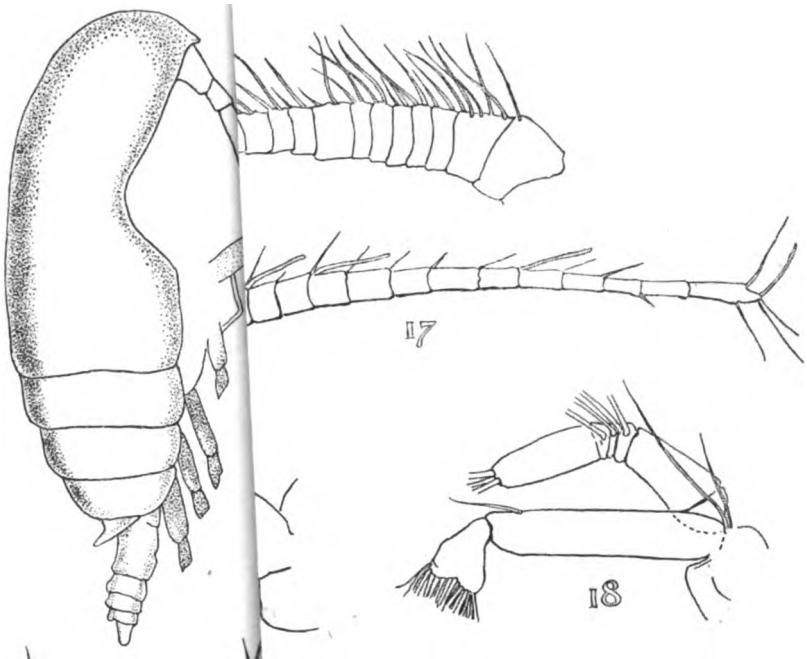

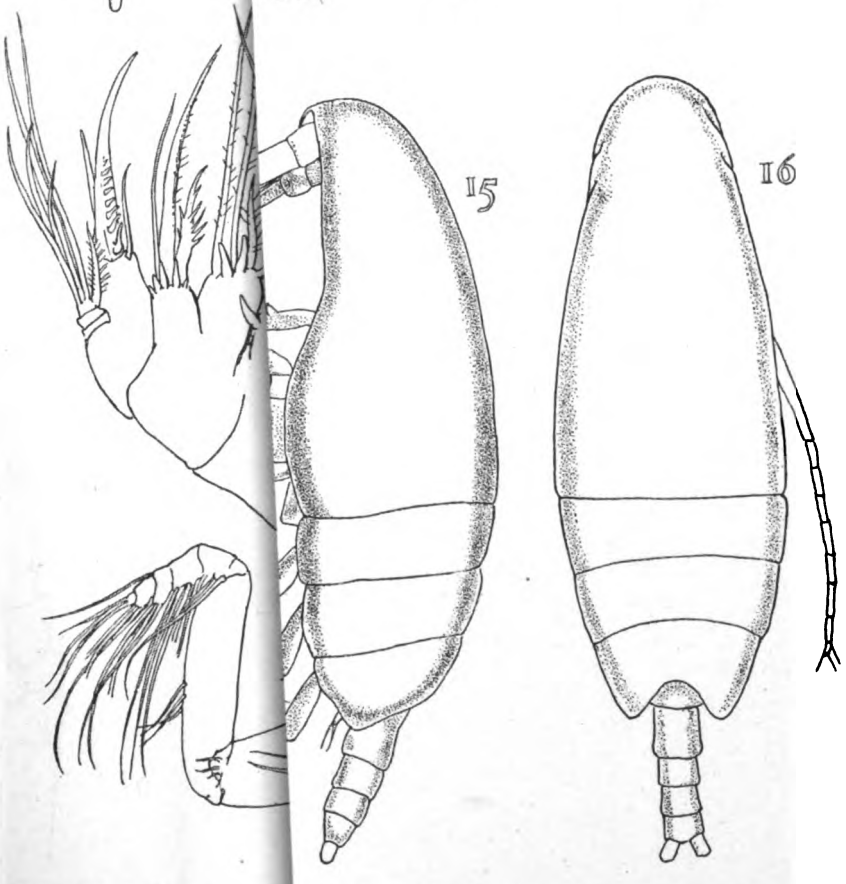

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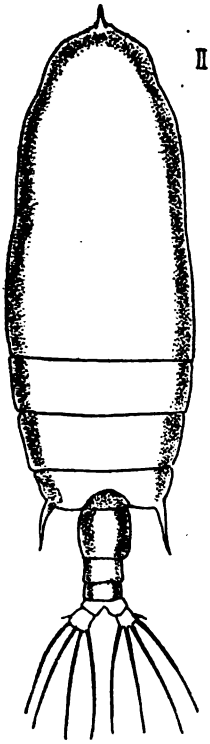

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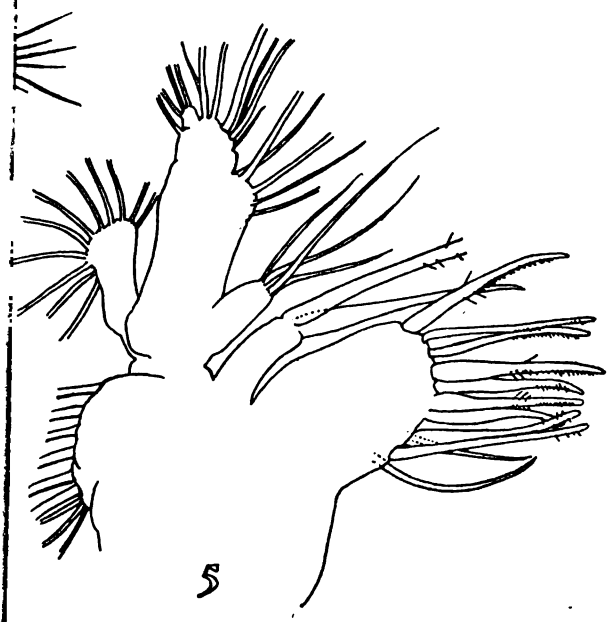

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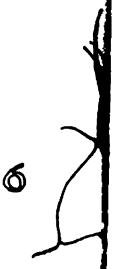

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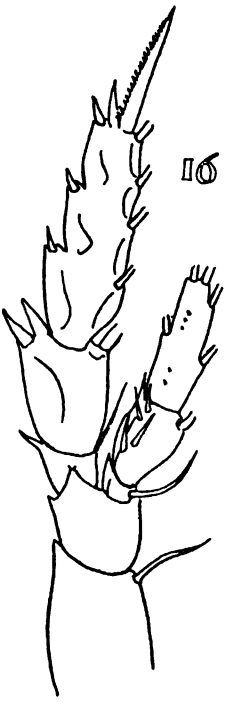

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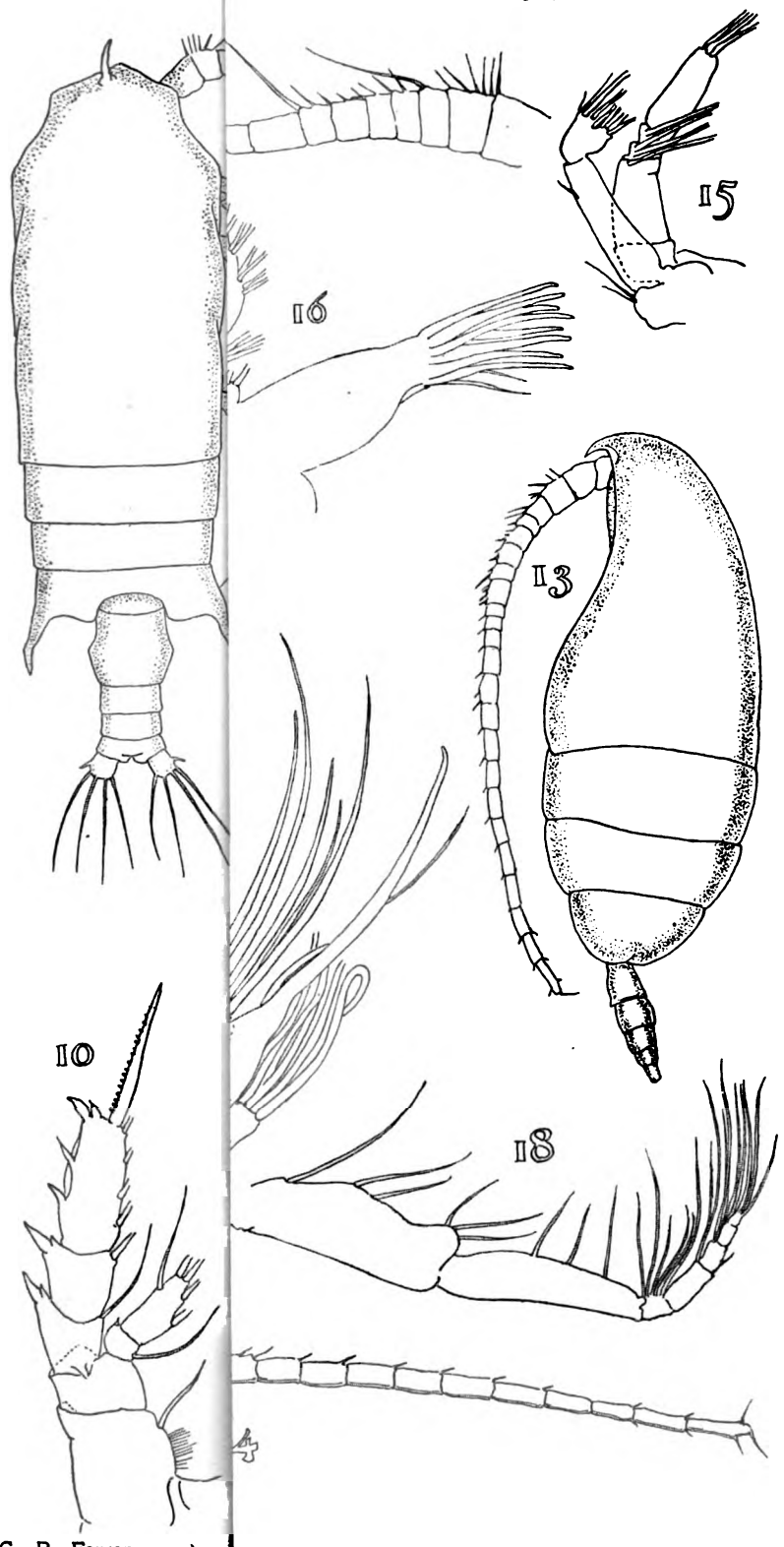

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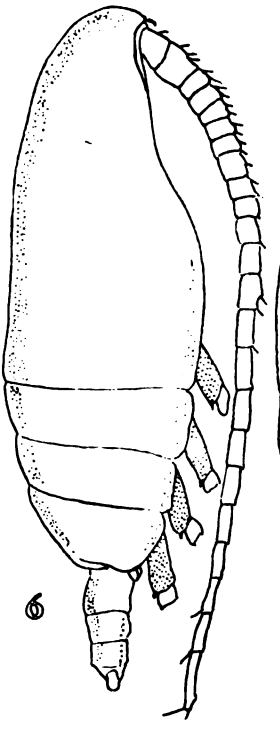

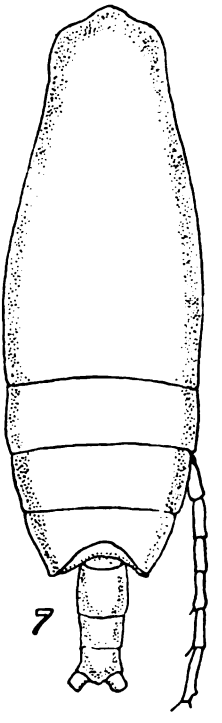

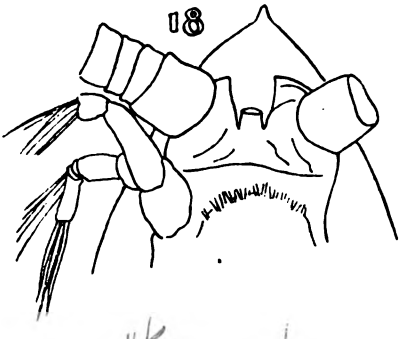

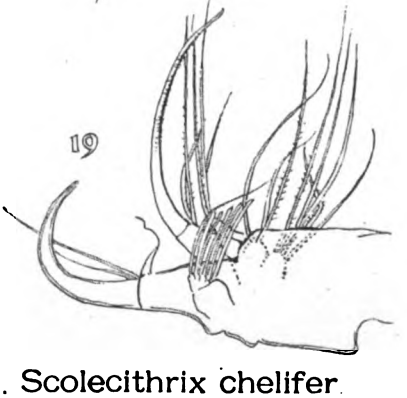

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G. P. Farran } del. 8-19. Scolecithrix chelifer.

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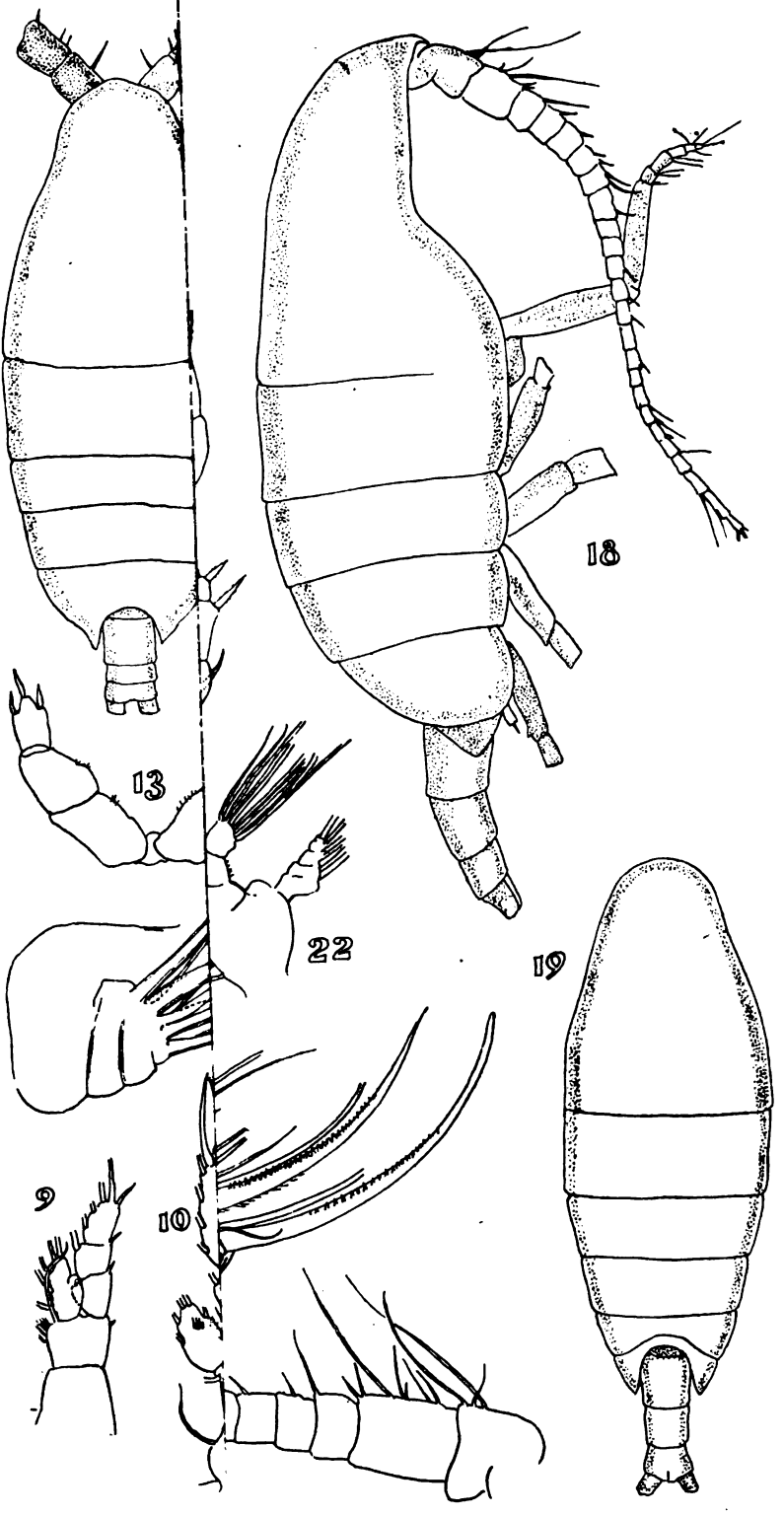

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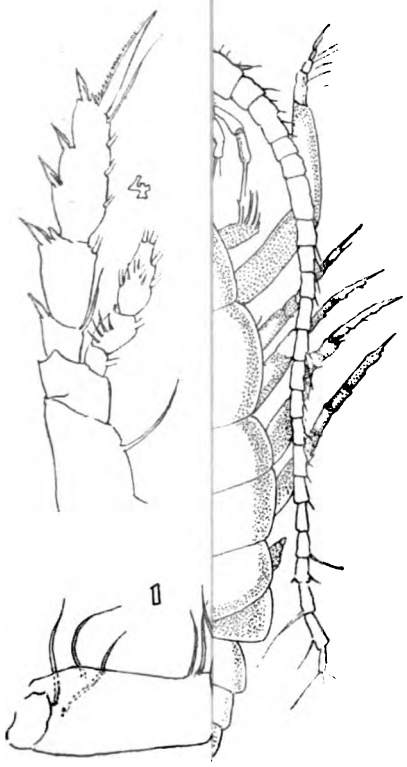

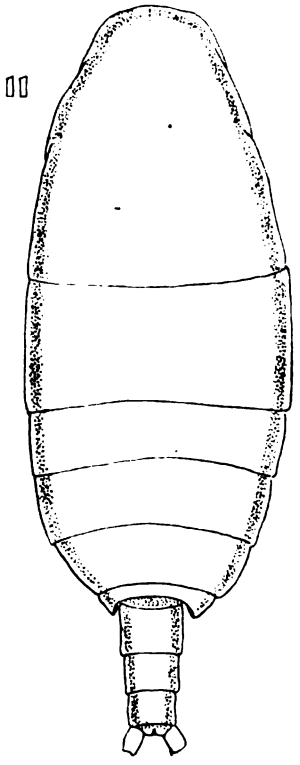

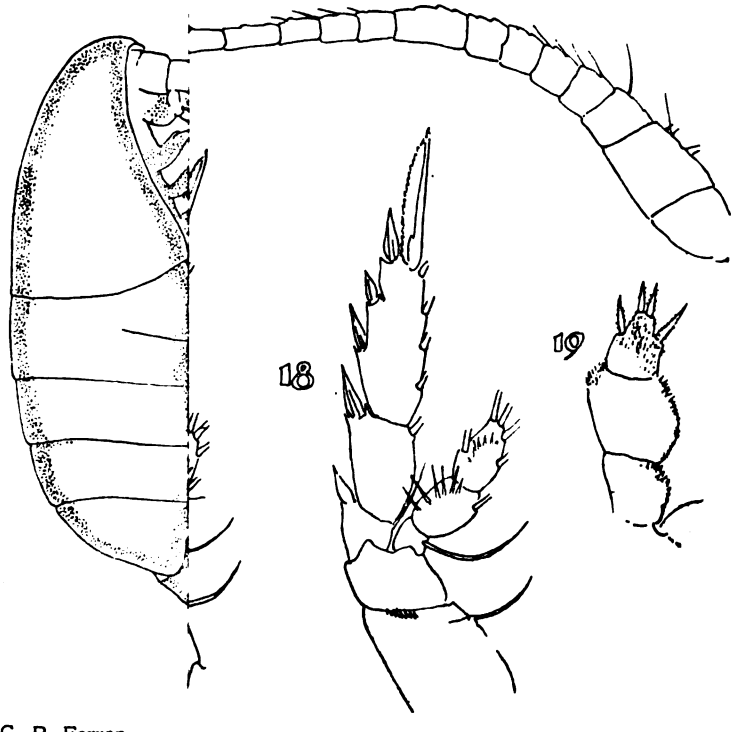

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H19. Xanthocalanus obtusus

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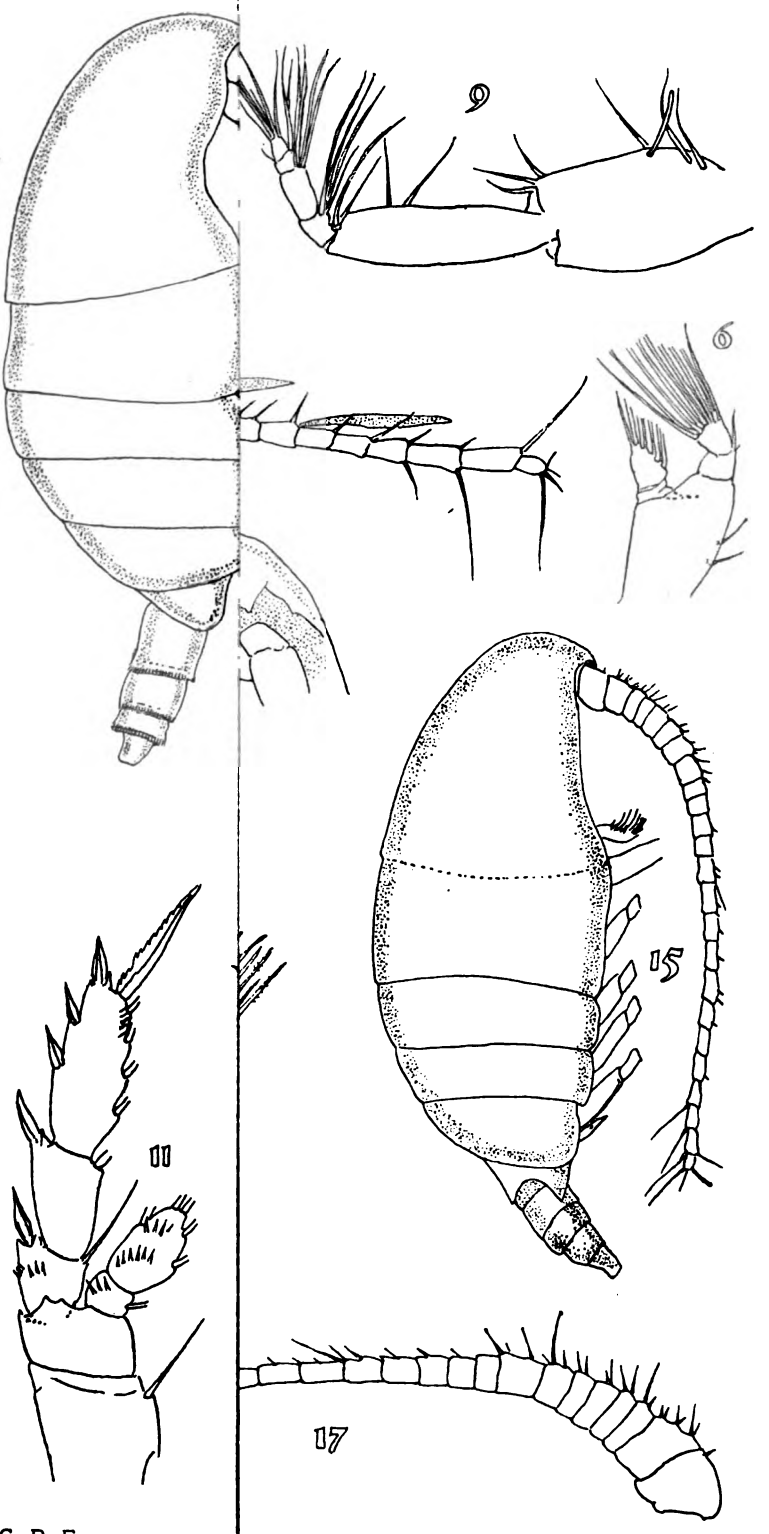
Pl. X.



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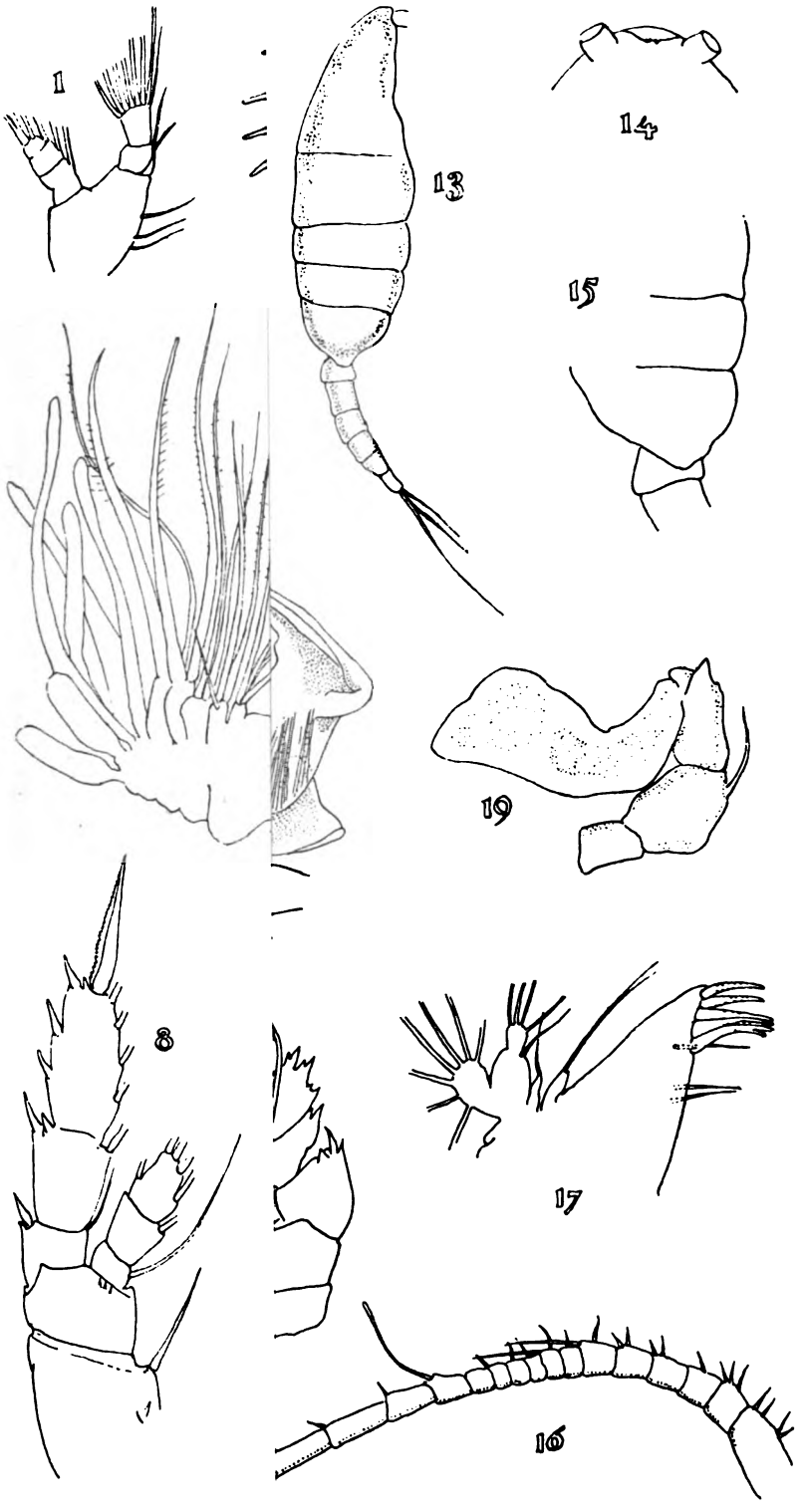

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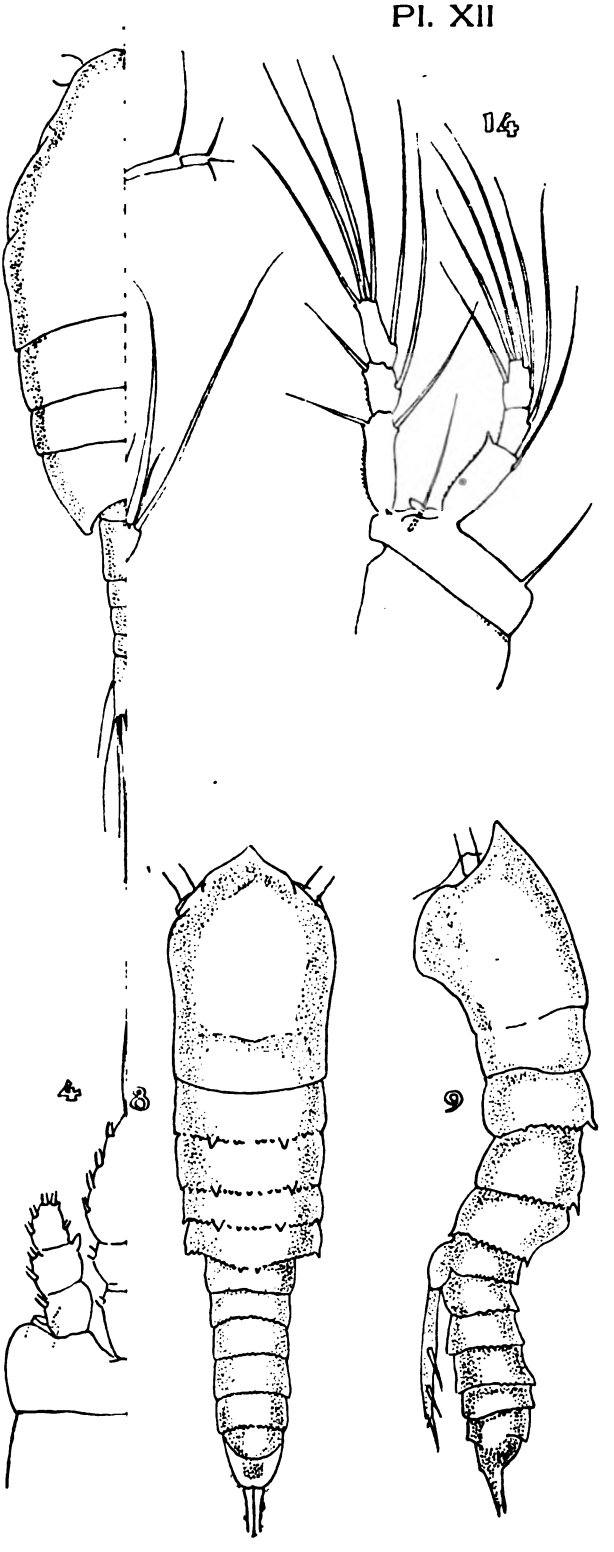

G. P. Fa
A. B. Wd spinulosus.

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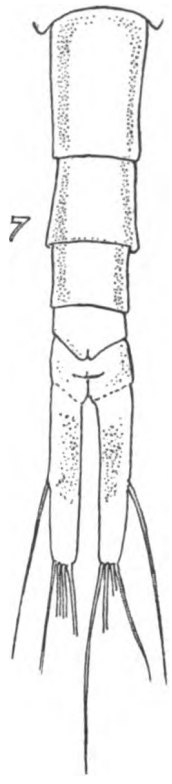

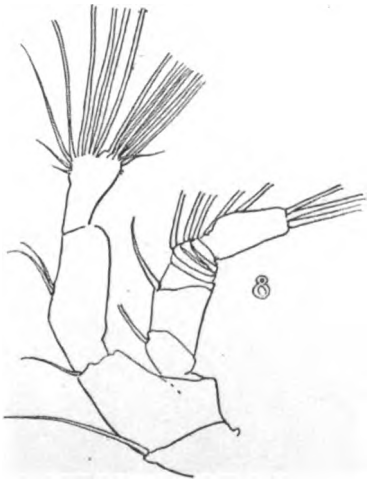

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The following papers have been published separately, and can be obtained on application to the Scientific Adviser, Fisheries Branch, Department of Agriculture, &c., Dublin.

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